FUJITSU

# Fujitsu Technology and Service Vision 2017

Book 1

shaping tomorrow with you

# Co-creating a different future

## Digital disruption

What is the one thing you would change about your business if you could? What is stopping you giving your customers the best experience they have ever seen? What would your business look like in your wildest dreams?

The future is becoming increasingly uncertain. Our global survey*[1] revealed that 75% of business leaders thought that their sectors will fundamentally change in the next 5 years. Today, digital technologies are moving into the heart of everything we do, changing the way people work, live and how they innovate. A new industrial revolution has already begun. We discussed this last year, and it continues to gather momentum. The transformation of manufacturing industry with digital automation has gained widespread attention, and a wide spectrum of services are being impacted, from Finance to Retail and even the public sector.

To our surprise, business leaders are quite optimistic about potential consequences of digitalization. Last year 67% of business leaders told us they are enthusiastic or excited about digital disruption. The transformational power of digital may encourage new competitors to enter their industries with game-changing services. But it also enables companies to capture tremendous opportunities for growth. Digital can help realize higher productivity, better customer relationships, and new product innovation. Many organizations have embarked on the journey of digital and are already delivering outcomes. In our survey, 89% of the respondents told us they were executing, trialing or planning various digital transformation projects. It is more striking that 34% of these digital transformation projects had already delivered positive outcomes such as increase in revenue and better customer relationships.

## A digital society

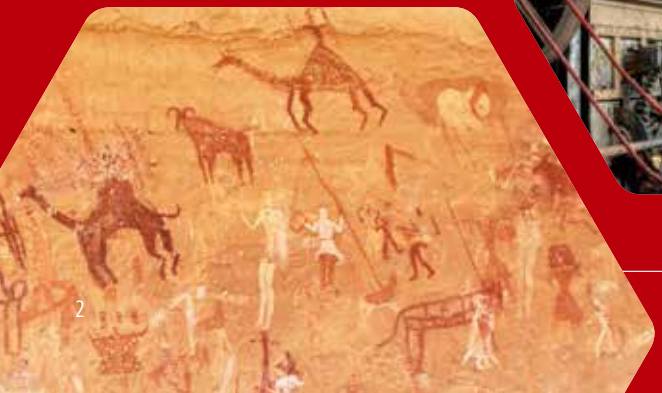
Digital is opening the door to a new society. Looking back over our history, human beings have seen four types of societies. Primitive hunter-gatherer societies transitioned to more labor-intensive agricultural societies, enabling significant increase in productivity and population. The industrial revolution in the 18th century triggered the emergence of industrial societies. Big companies were organized to produce many things such as cars and home appliances in a massive scale, enriching the lives of people. To do so meant coordinating scarce resources such as labor, natural resources, plant and machinery and financial capital. More recently, we have experienced a dramatic shift to post-industrial information societies. Now services account for over 70% of the total value add of OECD countries. Human knowledge is driving the economy. IT, especially software, has fueled the growth of productivity, by helping people to create, communicate and use knowledge.

But today, digital technology enables people, things and processes to be hyperconnected, sharing information. Artificial Intelligence (AI) learns by using massive amounts of data,

Agricultural

Industrial

Post Industrial (Information)



Hunter-gatherer

# Digital

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helping us to work more creatively and make better decisions. Advanced robotics technology allows more autonomous operations. Blockchain provides a potential to drastically change the way businesses conduct highly trusted transactions. 3D printing has a promise to produce at an instance whatever people design in their minds. Hyperconnectivity and intelligence derived from data will empower people to create innovation.

The digital society means a change in the way value is created. Digital technology drives value to be oriented around people. This happens because in a digital world, technology liberates businesses from delivering standardized services to users. Instead, individualized benefits and experiences are co-created by suppliers of services and products, their ecosystem partners and the users themselves. We call these Digital Arenas. For instance, today, the healthcare industry is set up to provide a service of patient treatments. Digital can free it and its adjacent industries, like pharma and insurance to evolve into a human centric Well-being Arena. Similarly, the transport sector and its adjacent industries like logistics and finance can develop into a mobility arena. Personalized medicine and care will help people live longer and healthier. People will enjoy stress-free mobility.

## Digital Co-creation

In this new digital society, digital co-creation becomes a business norm. Digital co-creation means blending your business expertise and digital technology, and creating new value together with ecosystem partners and customers to shape a different future. How do you position your products or services in an emerging Digital Arena? Which companies do you partner? (They may even be from different industries.) How do you embed digital technology into the heart of your business? How do you unleash the creativity of your workforce? These are key questions to ask.

Digital co-creation takes a different approach. Existing skills and experience are not optimized for the digital era, and a new type of Digital Workforce will emerge. Digital technology will augment the capability of people, enabling innovation and greater productivity. Now, people need to rediscover their human capabilities like creativity and empathy, as well as acquiring literacy in digital technologies.

Fujitsu wants to be your digital co-creation partner, together shaping a different future.

*1 Using an independent research company, Fujitsu conducted a global survey to CxOs and decision makers in September 2016. Fujitsu also conducted a follow-up survey in February 2017. In this second online survey, we received responses from 1,614 C-suite executives and business decision makers in 15 countries around the globe. For more detail please visit the each website.
Fit for Digital: Co-creation in the Age of Disruption : http://www.fujitsu.com/global/about/resources/publications/digital-disruption-report/
Global Digital Transformation Survey : http://www.fujitsu.com/global/vision/

*2 A system where multiple computers connected to a network share and mutually confirm information such as exchange records. Because it lacks a specific manager, it is resistant to tampering and attack.

# A conversation with the President

Digital technology is transforming business, society and the everyday lives of people. In this new digital society, we continue to be a technology leader, striving to meet our customers' expectations. This is why we are investing in four priority areas. Those are AI, Cloud, IoT and Security.

Among them, AI and security are essential drivers. Fujitsu has been developing AI technology for over thirty years. Leveraging our experience, we are confident to lead this technology area. We will proactively use and test new AI technology for our internal operations to provide fully-fledged solutions and services for our customers.

Today, security technology is supporting every aspect of society. Using the knowledge of our security experts, we have experience of operating large-scale systems and networks securely for many years. We will continue to strengthen our teams of security professionals to meet the demand of our customers and society.

In a digital society, a new approach is required. Open innovation is key for realizing our customers' digital transformations. We are actively shaping strong ecosystems that our customers, startup companies, academic institutions and partners participate in.

At Fujitsu, we firmly believe that technology enables people's happiness and wellbeing. As technology plays a more important role than ever before, we must put people at the center of everything we do.

Our 156,000 people across the world are committed to Digital Co-creation with our customers. We are confident that this will deliver significant benefits for our customers and for society. Fujitsu will continue to collaborate with our customers and partners to innovate and realize a safer, more prosperous world.

April 2017

Fujitsu Limited
President and Representative Director
Tatsuya Tanaka

Tatsuya Tanaka

# Human Centric Innovation

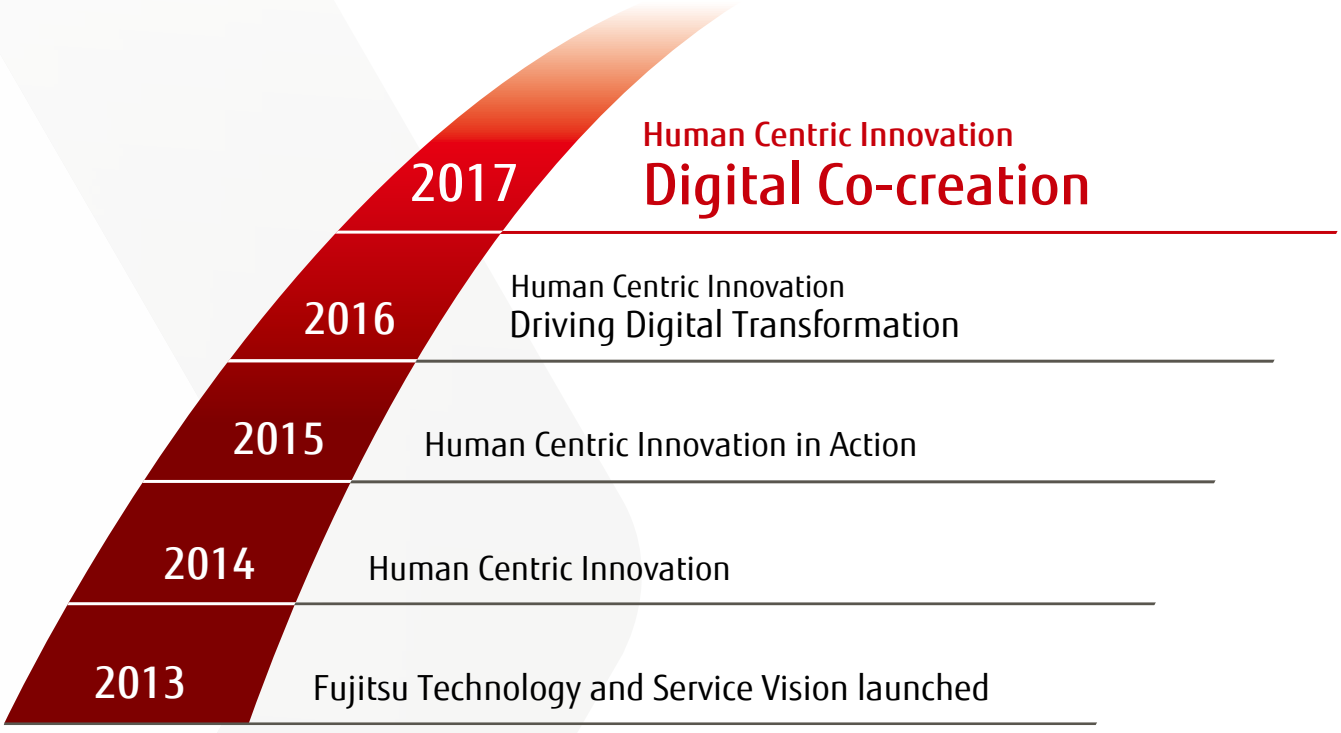
The Fujitsu Technology and Service Vision sets out our vision and is intended to provide insights to leaders of business and the public sector of how they can use ICT to create innovation and build a different future. We first launched this in 2013, and have updated it annually ever since. Our vision underpins all of our operations, from research and development to customer engagement and delivery.

Fujitsu's key proposition is Human Centric Innovation. We first expressed this central idea in our vision in 2014, to describe Fujitsu's unique approach to creating business and social innovation by empowering people with advanced technology. It is realized by combining three key value drivers: the creativity of people, intelligence derived from information, and connectivity of things and infrastructure. Human Centric Innovation is also a journey. We have been working with our customers and partners to deliver innovation and drive digital transformation.

The theme of this year is Human Centric Innovation: Digital Co-creation. In order to thrive in a new digital society, it is crucial to co-create innovative value with your customers and partners across industries. It is also essential to blend your business expertise with digital technology expertise.

We believe a human centric approach is the only way to deliver on the promise of digital. As AI and robotics become more mainstream, human characteristics like creativity and empathy become ever more important.

We hope this booklet will give you the insights you need to thrive in this revolutionary period.




## Related Information and Website

The Fujitsu Technology and Service Vision 2017 was created by a team of Fujitsu people from around the world. We are communicating it in these formats:

- Book 1 (this booklet) sets out our vision along with some insights on how business leaders can leverage for digital transformation.
- Book 2 provides insights on how technology leaders can provide digital leadership. It also features real examples of their digital transformations as well as Fujitsu's portfolio of services, solutions and products.
- Executive summary
- Website : http://www.fujitsu.com/global/vision/
- Contact : +81-3-6252-2220

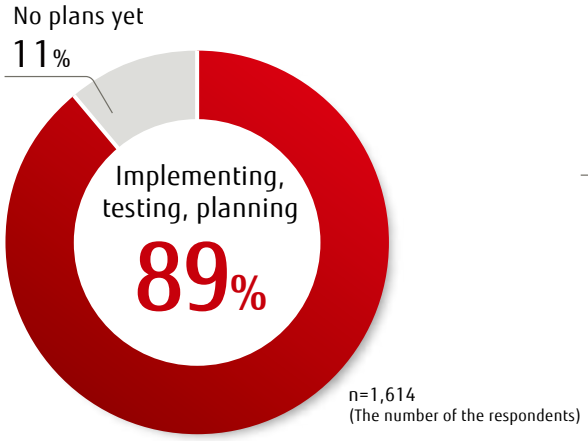
# Digital outcomes delivered

Digital is already here, transforming many businesses. Many business leaders are saying their organizations have already started to achieve transformational outcomes across multiple functions, particularly marketing, workstyle and operations and maintenance in a variety of industries.

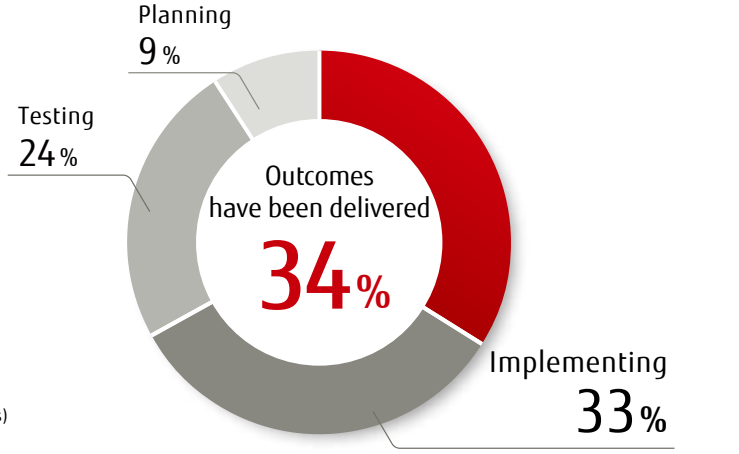
Earlier this year we carried out a global survey of 1,600 business decision makers, asking them for their views on digital transformation. The survey provides useful insights. See the graphic below.

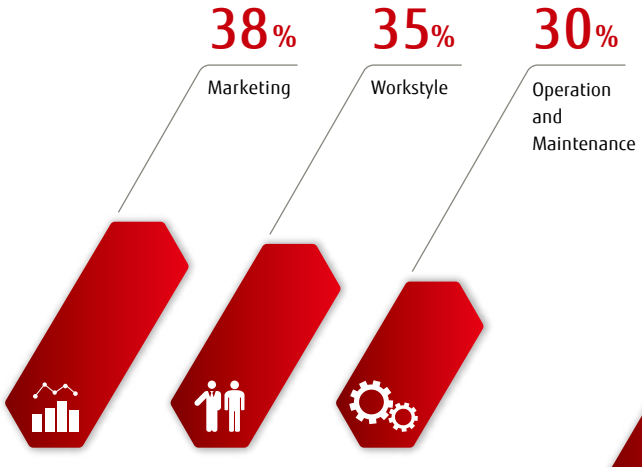
We have also asked about what are key promoting and inhibiting factors for digital transformation, and how they perceive the potential of AI. We will refer to some of the findings in this booklet as we go. You can also read and download an executive summary of this survey on Fujitsu Vision website http://www.fujitsu.com/global/vision/.

## Have you started digital transformation?




## What is your progress with digital transformation?

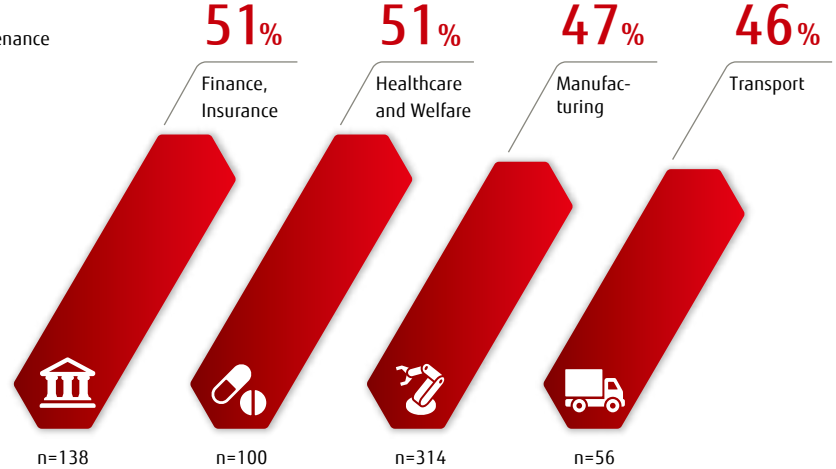



## What is the functional focus of your digital transformation?

n=1,614 (The number of the respondents)

## Have you embarked on digital transformation specific to your industry sector?




n=138 n=100 n=314 n=56
(The number of the respondents in each industry)

*The area of digital transformation in each industry which the respondents belong to.

# What is your disruptive vision?

One of the most startling findings to come out of our survey was this: over half of the business leaders questioned thought their organizations would not exist in their current form in 5 years' time. In the same survey, 73% of business leaders said technology was at the heart of an organization's ability to thrive.

Digital disruption means that our organizations' futures will make radical departures from where we are today. Making incremental changes, looking for small improvements is only of limited value. What is called for is a rethinking of your business and how it creates value, based on the opportunities that now exist.

To do this requires organizations to be bold, both in thought and action. They need to create a disruptive vision of the future. What is your business going to become? Today, this is the most important question and organization can ask itself.

Monique Shivanandan, Head of IT at global insurance company Aviva, explains, "IT is responsible for changing the way the business is going, changing the products that the business offers, changing the culture of your organization, changing the way it interacts with customers and the brand that we want to present to them," she says. "Every business is [now] a technology company – whether they realize it or not." [from I-CIO*3]

## Three Questions

Designing a digital business in this uncertain world is not straight forward. Before getting into the details, it is worth spending time and asking fundamental questions. Especially to think about people, business and society.

- How do you design your digital workforce?
- How do you design your value in a Digital Arena?
- How do you design the alignment of your value with a shared value of society?

We envision a future where relationships between workforce, enterprises and society will be interconnected. Workforces will be highly empowered and aligned with organizational goals of creating value for people. And organizational goals are achieved through digital co-creation aligned with a shared goal of society.

In the following chapters, we explore mega trends and potential scenarios at each of the three levels of people, business, and society.

*3 A global web site for the elite of information technology management, sponsored by Fujitsu
http://www.i-cio.com/

# People in the digital era

People are getting healthier and living longer.
The advancement of AI and autonomous robots will continue to accelerate.
Organizations need to design and create new digital workforces,
which can combine the creativity of people with
the insights delivered by digital.

# What will our future life look like?


The average life expectancy has continued to rise, thanks to better medicine and living conditions. Professor Lynda Gratton of London Business School believes that today 50% of children born in developed countries could expect to live over 100 years.*4 But as a consequence people born in 1998 will have to work much longer – into their 80s - to save money for retirement. She told us that people will experience multiple stages of life. Instead of the traditional 3-stage life of 'learn, work and retire', people may spend some years exploring new possibilities, or have a portfolio of multiple jobs inside and outside their organizations. Such a long work-life will demand people to reinvest in new skills, knowledge, relationships and networks for transitions. But what kind of skills should they invest in?

At the same time, a new breed of technologies, AI-based algorithms and autonomous robots, that seem to provide human-like capabilities, are developing rapidly. Deep learning technology enables a cluster of networked computers to learn and identify patterns from huge amounts of data, acting on its own. The technology is particularly good at recognizing images or naturally spoken voices. Autonomous vehicles are already functionally proven in testing and it is expected that fully autonomous driving cars will be on the roads in some places by 2020. This digital innovation is expected to bring a large-scale of positive business and social outcomes. It could reduce traffic accidents and congestion significantly, while reducing pressure on the environment. It could also help people have more productive time while travelling.


However, it could also cause professional drivers to lose their jobs. A study of Oxford University in 2013 reported that 47% of jobs in the US will be subject to replacement by intelligent computers in 20 years.*5 There is a debate over the potential threat of AI and autonomous robots against job security. We should respect these views and take a cautious approach. But we also have to look at positive impacts these new digital technologies can deliver. New technology creates new jobs. Industry 4.0, a German initiative of manufacturing transformation, expects to increase both the number of robots and number of jobs. In Japan, the working population is actually shrinking. Japan's working age population is expected to decrease from 81 million (64% of the total) in 2010 to 44 million only (51% of the total) in 2060.*6 In this situation, the Japanese Government and businesses are seriously looking to intelligent computers and autonomous robots to meet this shortfall. What strategy should business leaders take in such a revolutionary period? How can they design a future workforce that effectively balances the capability of people and the benefit of digital automation?



*4 Lynda Gratton & Andrew Scott "The 100 year life" 2016, and Fujitsu Executive Forum, Opportunities and Challenges in the 100-Year Life: A Discussion with Professor Lynda Gratton
*5 Carl Benedikt Frey and Michael A. Osborne, Oxford University " The Future of Employment: How susceptible are jobs to computerisation?" 2013
*6 Ministry of Internal Affairs and Communications. Japan " White Paper 2016 Information and Communications in Japan"

# Digital promise and human creativity

## Limits and opportunities

Business leaders are enthusiastic about the potential of AI and eager to use it for their businesses. In our survey, 77% of business leaders responded that they see AI as an opportunity. Regarding the implications of AI, 82% of business leaders agreed that AI would enhance the capabilities of people in the future. At the same time, 65% of them thought AI would substitute a work of people in the future.

We should take a realistic look at what kind of tasks AI is capable of doing. Since 2011, Fujitsu has been working on an ambitious project with the National Institute of Informatics of Japan, called "Can a robot get into the University of Tokyo". The purpose of this project is to assess how far AI can do the cognitive tasks which humans can do. An entrance exam to the top-ranking university of Japan is a good benchmark. Fujitsu has been collaborating in the mathematics team, and in 2016, our software robot achieved a very high score at a practice entrance exam in mathematics. In fact, the score was sufficient to meet the standard required for the University of Tokyo in this subject. The overall scores of all subjects were high enough to pass the entrance to approximately 80% of Japan's universities. At the same time, however, the project faced a difficulty in making the leap required to raise scores for understanding English and Japanese languages to the very highest level. This is because AI technology cannot read and understand meaning. Although it can find the statistically most suitable answers, it cannot develop context as people do. In other words, AI lacks the common sense which people have learned from day-by-day experience.

This has major implications for how to realize the true potential of these technologies. Intelligent computers are good at analyzing numerical and textual data statistically, autonomously recognizing images, or responding to voice queries through natural language processing. They can carry out specific tasks very well, thanks to the advance of computing power and methodology. For example, Fujitsu's computer vision*7 leverages deep-learning-based algorithm running on our high performance computing system. This technology innovation can, for instance, automatically recognize the rush-hour movements of vehicles and pedestrians across an entire city. But current AI systems are still not able to understand the complexity of context, which people can do all the time. If you believe AI can do everything, you will be disappointed.

## People are key

If we imagine living in the future and looking back to today, the digital era may well have been labelled as the 'human era'. The advance of AI and autonomous robots is leading us to revisit who we are. Our brain is capable of flexibly processing complicated cognitive tasks. But it consumes ultra-low energy, which is about equal to what an ordinary light bulb uses. Our


*7 A technology enabling a computer to see as humans see, leveraging image recognition.

bodies are intricately woven systems of systems. We have emotions, intuitions and creativity. We don't live in isolation, but openly and socially with other people. We are able to carry out an extensive range of physical tasks unconsciously. All these are enabled by interactions of our brain, body and environments. AI and autonomous robots lack the rich tacit knowledge and intangible qualities we have.

In this digital era, we believe it is utmost important to put people at the center of everything. It is people who choose a future, set out a purpose and create innovation. The analytical power of AI and the creativity of people are complementary. Digital technology augments the capability of people to realize previously unimaginable breakthroughs. And people must be more human than ever, rediscovering our unique qualities.

## Digital Ethics

AI has created widespread concerns about its potential to cause harm to society and individuals. At Fujitsu we believe that AI is not only complementary to human capabilities, but has the potential to greatly empower people and promote positive and far reaching benefits across society. We design and develop AI technologies solely with this aim in mind. This belief in technology contributing to society has led us to develop many innovations, throughout our history. We appreciated the importance of putting people at the center, and this has become the central idea of our vision, Human Centric Intelligent Society.

In a digital society, every stakeholder must discuss technology's impact to society, and develop a common understanding of its consequences. It is people who make and grow AI. It all depends on what kind of future we will choose.

# Digital Business Workforce

## AI helps clinical decisions

Dr. Germán Seara Aguilar, MD, PhD, of the Institute of Sanitary Research of the San Carlos Clinical Hospital, Madrid told Fujitsu, "Establishing predictive analysis models for the next step will allow us to let patients and the public play a much more active role in their own health. An informed patient must be able to make decisions on what they want to do with their life. Medical practitioners will act as consultants who provide patients with advice, but it's their life."

*Fujitsu has been collaborating with San Carlos Clinical Hospital to develop an AI-based support system to help clinical judgement in the area of mental health. The risk assessment of alcohol and drug abuse or suicide is time-consuming work, requiring investigation and cross-referencing of similar clinical records and relevant research. Fujitsu developed a risk assessment algorithm, leveraging our unique AI technology. Our system learned the fully anonymized historical clinical data of 36,000 patients as well as non-clinical data such as medical research papers to provide effective assessment. We conducted a trial of using this algorithm to analyze the clinical data of thirty patients. We compared the assessment by the AI algorithm and the assessment by five experienced clinical doctors, achieving over 85% accurate matching between the two assessments. The system frees up doctors from time-consuming research and improves the productivity and quality of clinical assessment. We are now working to commercialize this service.**[8]*

## Hybrid Learning

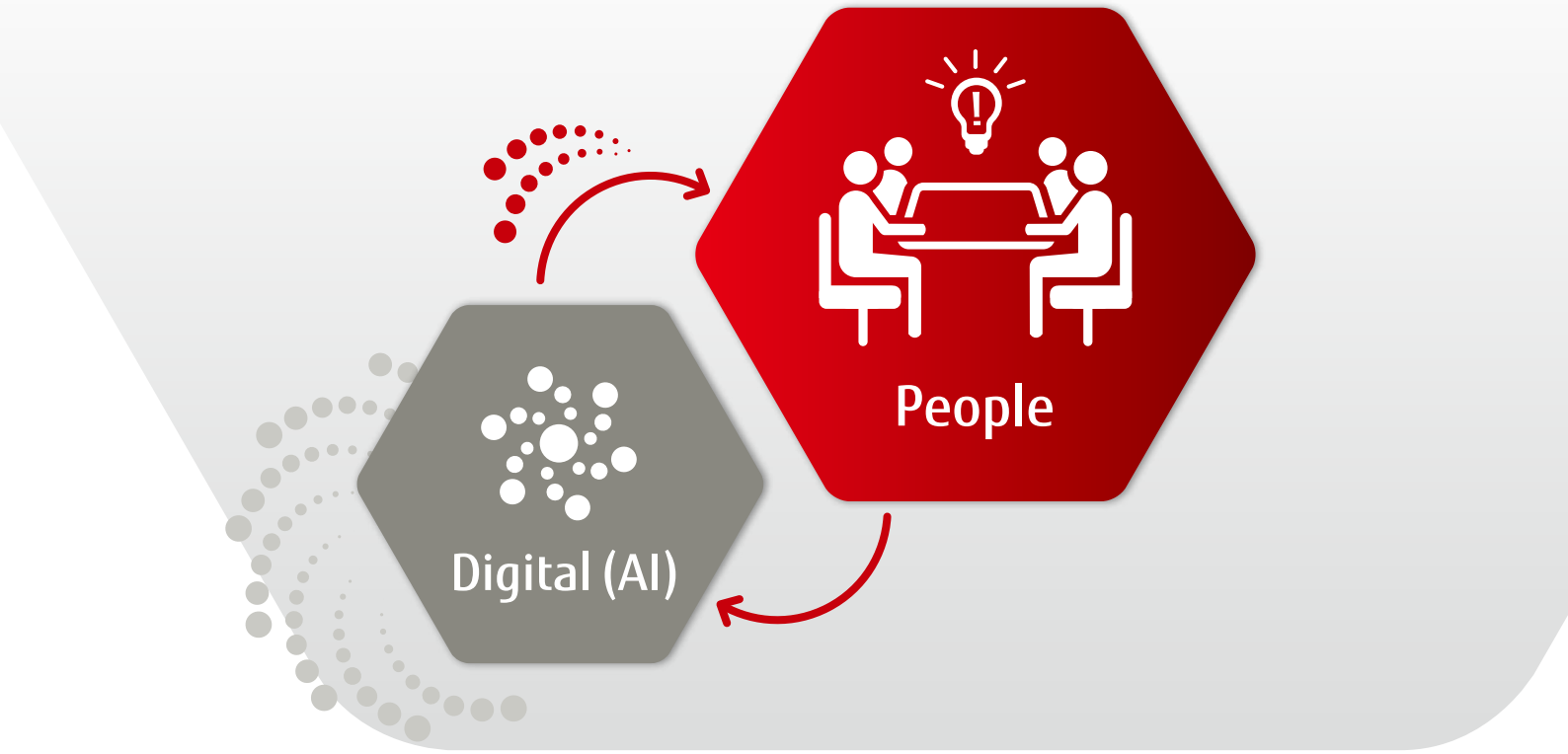
Organizations can continuously generate innovations by institutionalizing the flow of creating and accumulating new knowledge. Organizational excellence of learning is exceptionally important. They apply the acquired knowledge to improve their products, services and operations. They also use the acquired knowledge to transform their business and create innovation. In this process, people also use their intuition and tacit knowledge. For example, customer-facing staff communicate and interact with their clients, understand their concerns and expectations, even if these are not explicitly delivered.

AI-based intelligent systems allow organizations to learn from data, acquire new insights and apply these insights to help their people to make better decisions. Digital can search huge amounts of data and find out the most relevant information instantly. Digital can provide unbiased and even unique recommendations based on statistical analysis. And digital can make useful predictions.

We foresee the future digital workforce working closely with the help and advice of AI-based intelligent systems, together processing a wide range of tasks. This is a hybrid learning process. People will be assisted by an intelligent system for useful information and recommendations. People may acquire new strategies or see new possibilities as a result. For example, in chess and shogi, human players have learned new



*8 For details please see Book 2 page 22




strategies and techniques from observing how a machine plays. As Dr. Seara of San Carlos Clinical Hospital told us what could happen in the future, people will be able to make a better decision on what to do.

On the other hand, an intelligent computer will be given a purpose and guidance on the correct answers from people, further raising the accuracy of assessment and predictions. These continuous interactions and learnings accelerate the flow of new knowledge, combining data-driven intelligence and human wisdom, and driving new innovation.

## Connected Open Workforce

Unirobot, a Japanese robotics developer, is working with Fujitsu to develop a 'personal partner robot', to support individuals by learning their personal interests, preferences, and lifestyles. Taku Sakai, their president, told "Together with Fujitsu, we are jointly developing a human centric AI engine that even recognizes subtle conditions of their minds. The partnership with Fujitsu gives us technology resources as well as opportunities of expanding business and ecosystems".

In a digital society, borders of organizations are blurred. Open innovation is already very popular. To complement internal resources and create innovation with greater agility, many enterprises are working with external partners, research institutions and startup companies. Fujitsu is also expanding collaboration with global technology companies, industrial companies as well as universities across the globe. We are also rapidly developing a community of start-up companies through our MetaArc Venture Program.*9 This program provides unique opportunities for collaboration between enterprises in various industries, Fujitsu's lines of business and start-up companies. Unirobot is just an example.

Beyond open innovation, digital technology is enabling organizations to tap vast external resources through the cloud. This is not limited to digital start-ups and small to medium size enterprises. Big enterprises also have to seriously look at leveraging the creativity and knowledge of crowds. Intelligent systems will facilitate such collaboration.

Taku Sakai, President of Unirobot and the partner robot 'unibo'

*9 MetaArc Venture Program http://www.fujitsu.com/jp/innovation/venture/

# Designing your future workforce

## Overcoming a common dilemma

In our survey, we asked business leaders what are the key factors for their successful digital transformations. They answered that "talented staff with right skills", "streamlined organizations/processes for transformation" and "strong leadership" were the most significant factors. Asked what was hindering their transformational processes, they cited a lack of the above factors, also adding a "fear of change and internal resistance to transformations".

We believe many organizations have a common dilemma: their culture and procedures are too well suited for their existing businesses and the environments they operate in. In pre-digital societies, businesses are working to produce standardized goods and services. Enterprises compete to improve the value of goods and service in terms of quality, costs and delivery. For this objective, people are motivated to work for incremental improvements and minimize risks, where failures are punished. These are not bad principles for encouraging excellence. Fujitsu is no exception. But in digital societies, enterprises must also learn a different organizational skill. Agility is crucial for successful digital transformation. This is more commonly found in start-up digital companies, where failures means 'not trying' instead of 'not succeeding'. A change of approach is required. People need to have a more balanced view over opportunities and risks. They need to draw a big picture vision first, and constructively learn from failures to capture opportunities.

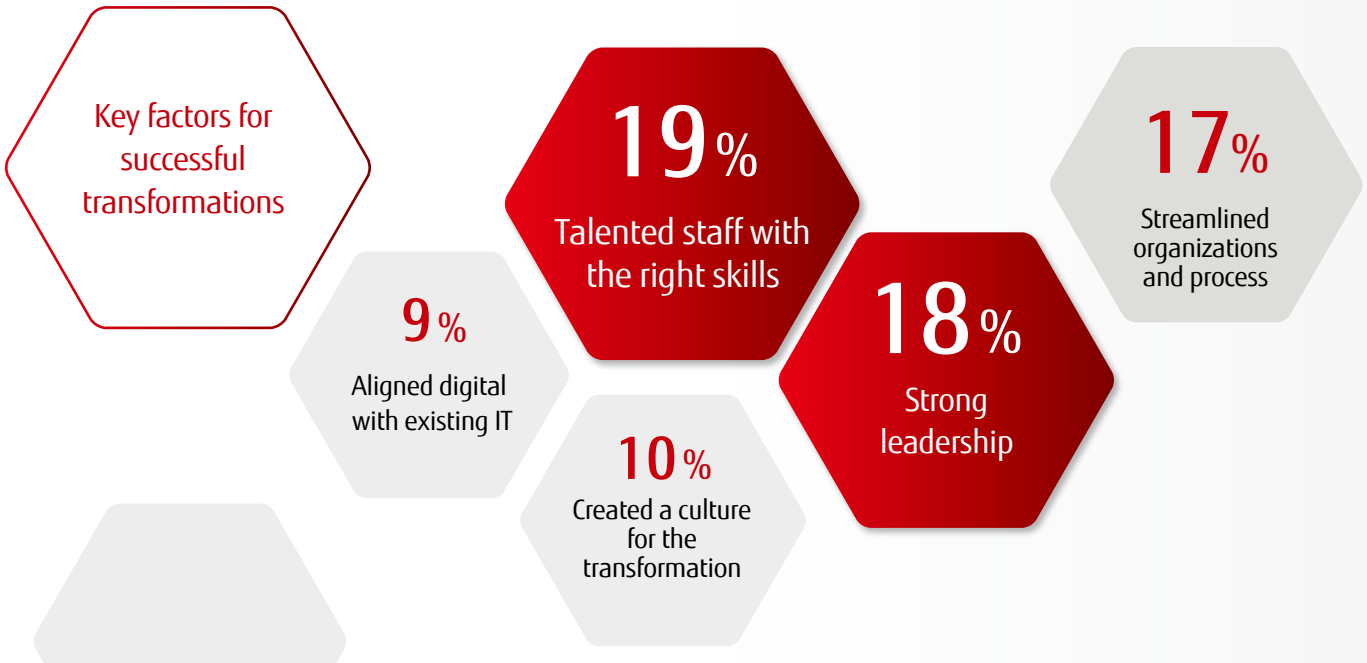
## Your disruptive vision for your workforce

How should we approach the transformation of our workforce to become fit for digital? What skills do our people need to realize the full potential of digital?

Business leaders chose "professional knowledge of digital technology" and "creativity and imagination" as the most important capabilities that people need to strengthen in the digital era. Industry and business-related professional knowledge follow after these two. It means that we need balanced skills of digital technology, creativity and business to drive digital transformation.

To undertake your journey of workforce transformation, we believe a design thinking approach is the best way to start. Design has been used for various fields from fashion, buildings, cities and industrial goods to hardware and software. Recently, design is increasingly applied to drive innovation, business models as well as social transformation. We believe the best approach is to start by discovering who you are and to create a vision of the future. Then, to work backwards from there to arrive at your innovative strategy for today.

Fujitsu has developed a unique design methodology to achieve this. We call it Human Centric Experience Design. It is used for designing user experience, business innovation and, of course, workforce transformation. It comprises three steps:



01 **Creating a vision**
Find out what values and experiences you want to realize in the future

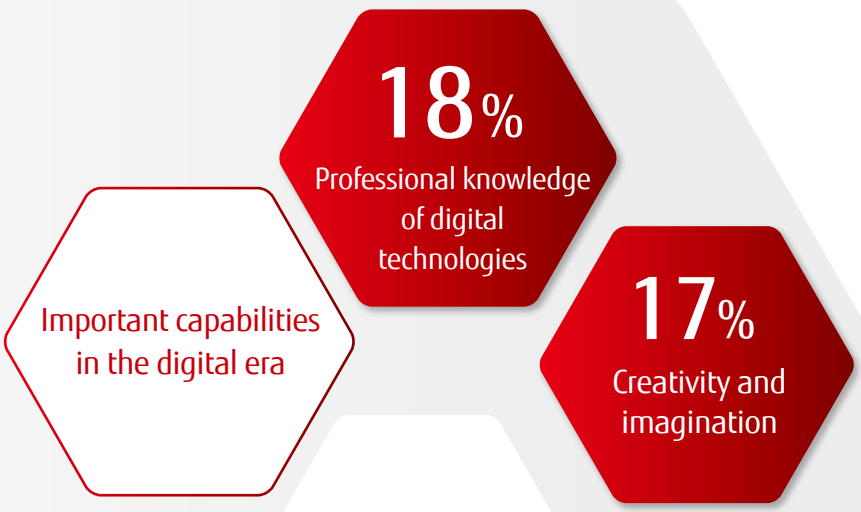
02 **Creating an innovative concept**
Craft new ways of realizing these values and experiences by co-creation with ecosystem partners and customers.

03 **Developing an execution model**
Develop a prototype in an agile, interactive manner, and refine it with ecosystem partners and customers

Co-creation workshops are very effective at unleashing the creativity of people. Fujitsu is now working with many of our customers in this way. For example, Fujitsu worked with a leading bank in Spain to transform their branch business and create their workstyle vision. We jointly held an emerging technology workshop with them to see how technology could impact their future. It was followed by design thinking workshops to create concepts. The bank proceeded to deploy prototypes, and is currently scaling them out commercially. The project is a perfect example of Digital Co-creation, participated in by the bank, Fujitsu's professionals and designers, and external professionals.

## Summary

- Set out your vision for your future workstyle.
- Design a model that leverages a combination of human creativity and insights delivered from AI.
- Grow and nurture talent for the digital era, focusing on digital expertise and creativity. Be agile in preparing for changes.



# Co-creating Digital Business

Digital is becoming incorporated right into the heart of business, delivering transformational outcomes.
The best way to grow business in the digital era is to co-create value with ecosystem partners and customers in Digital Arenas.

# Your business in the future?

What would it mean if you could read your customers' minds? What would it be like having x-ray vision over your business, so that no asset or activity was hidden from your view? What would it mean if you could predict the future? What if you had an intelligent assistant to help you make the right decisions? What if you could solve complex problems, like understanding what turns a boom into a burst? What if smart robots could do all your painstaking tasks for you?

Such imaginations are perhaps more familiar to readers of science fiction than business leaders. But science fiction is becoming a reality. Over the next couple of decades, advances in technology will enable transformational outcomes that would have been previously unthinkable. We are already seeing the seeds of a digital future, and in certain places can already experience what it might be like. 'The future is already here–it's just unevenly distributed', William Gibson, a science fiction writer famously remarked.

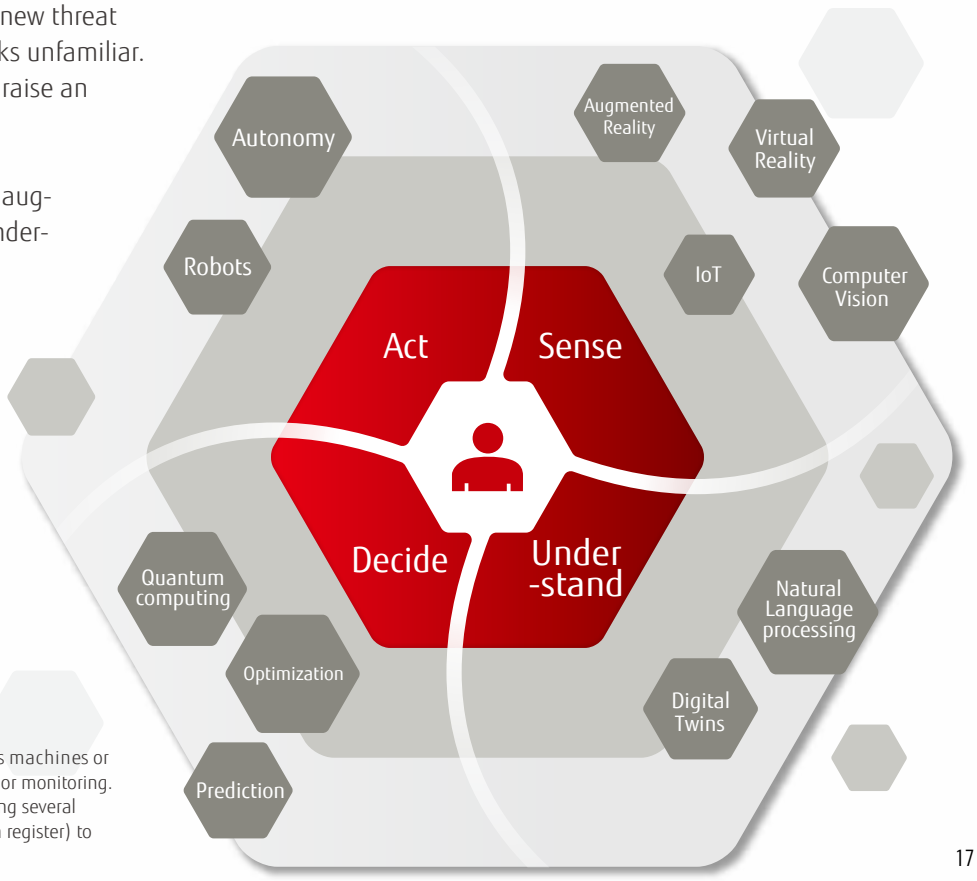
For instance, Fujitsu has applied AI technology to security protection. A big limitation of today's security systems is they can only detect against known threats. By converting system data into pictures, the AI 'learns' what the patterns of information look like. When a new threat comes along, the picture suddenly looks unfamiliar. So the AI can respond to the anomaly, raise an alert and prompt an intervention.

The potential is there in technology to augment our human capacity to 'sense, understand, decide and act'. For instance, computer vision could allow us to sense things we can't see. Augmented reality vision could help us to easily work out difficult tasks by putting relevant information directly into our field of view.

Digital technology also has the potential to broaden our understanding. Intelligent voice recognition could enable you to know your customers' feelings. The physical and digital worlds are converging, which means we can now make 'digital twins'*10 of physical things. We can use these to simulate anything from manufacturing lines or even to human organs. By simulating what could happen tomorrow, we can prevent failures in real time and deliver huge improvement to how things work.

Advances in technology will change our concept of decision making. AI could eliminate the human task of searching relevant information and provide predicative insights directly. Quantum computing,*11 which is close to being realized, holds the potential to answer types of questions that are currently impossible. For instance, it could enable us to find out the most effective measures for easing traffic congestion in mega cities.

Digital technology will also make the world more autonomous. AI and robots will take over many menial tasks safely and efficiently. Intelligent robots could provide an engaging means of providing support to elderly people, or people with illnesses or disabilities.




*10 Digitalized companions of physical assets such as machines or facilities that can be used for product simulation or monitoring.
*11 A computer that processes information by coupling several quantum bits into an array (known as a quantum register) to perform various computations.

# Digital: Business = IT

## Growth delivered by digital

In our survey, 46% of business leaders cited digital contributed to increasing revenues. 44% of them acknowledged their customer relationships improved as a result of digital. These were followed by other outcomes, namely strengthening product competitiveness, improving efficiency or reducing costs, and transformation of business model or processes. This finding has big implications for business.

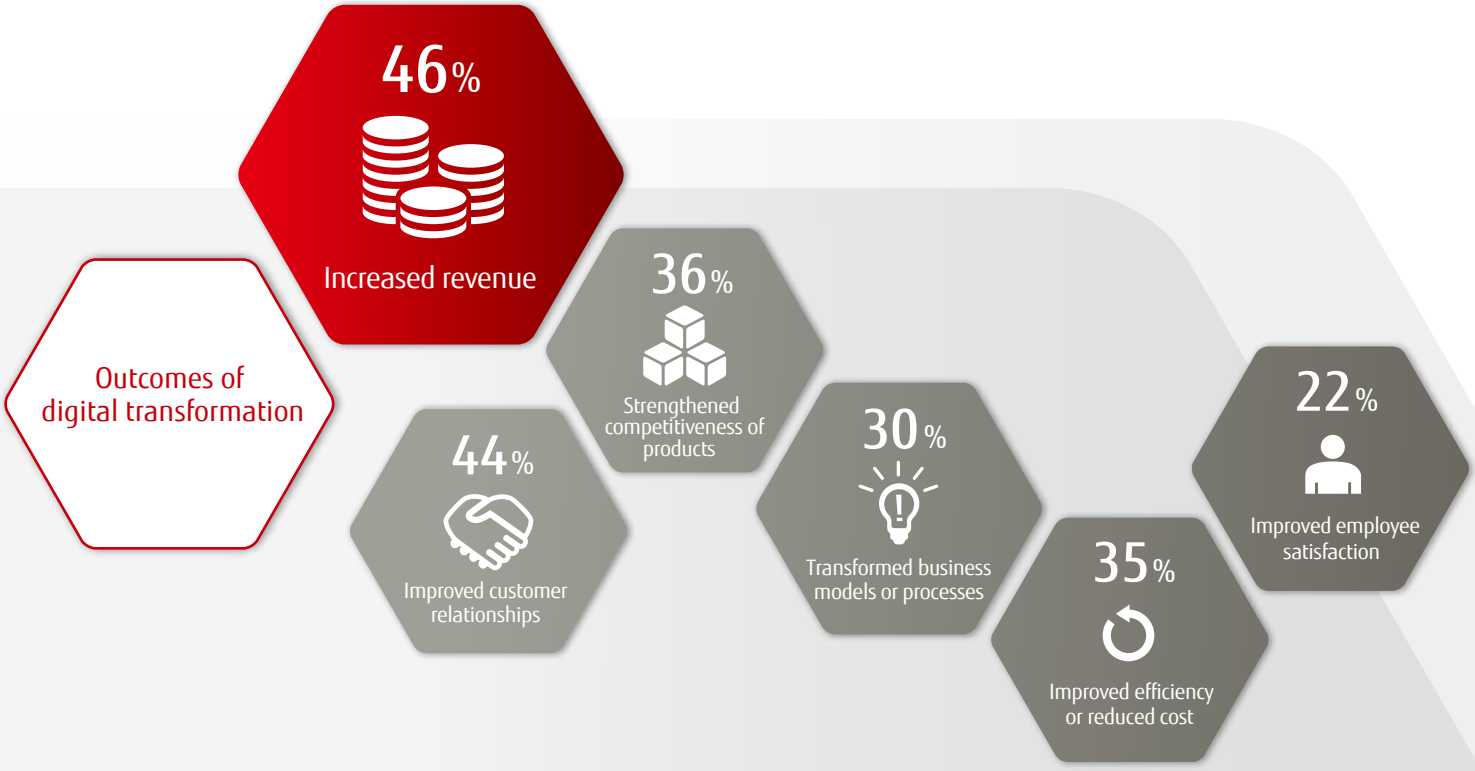
The top priority of CEOs is business growth. Multiple factors influence how organizations grow. But if we need to pick up the most relevant, they are better customer intimacy, operational excellence and innovative product and service, and the ability of transforming the business model. For instance, digital can help retailers better understand what their customers are thinking and tailor the way they engage. Digital can help manufacturers digitalize operations, improving productivity. Digital can help financial institutions use Fintech startups to deliver innovative services. Most importantly, digital can help transform your business model into a shared platform model, shaping rich ecosystem partners and serving significantly more customers.

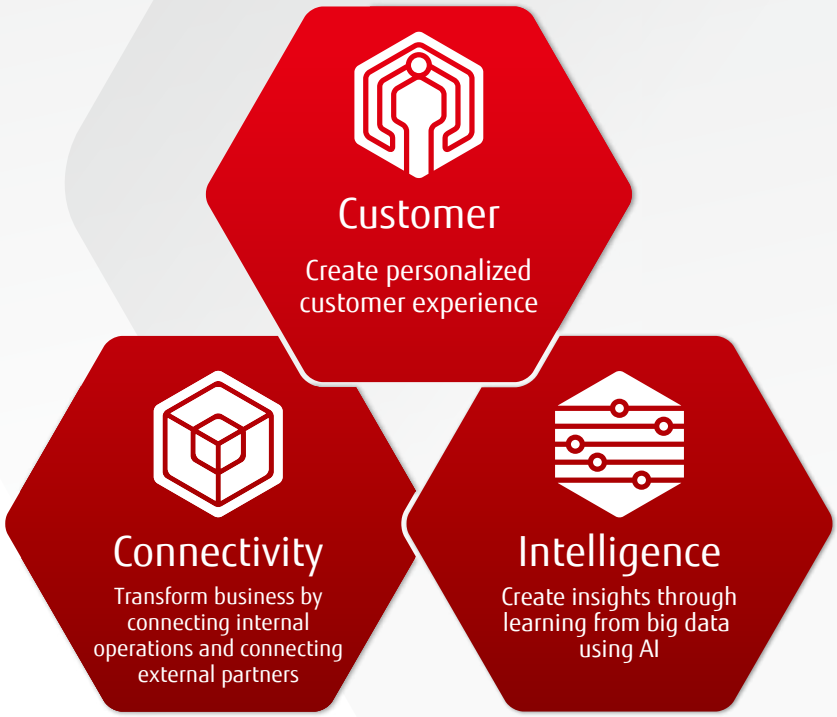
As we discussed before, every business is becoming a technology company. In a digital society, organizations are embedding digital technology into their core value-generation processes. These encompass customer facing, R&D, production, logistics and more. In a new digital society, organizations are required to take different approaches to create value. Let's look at three big transformational forces which digital will bring.

## Intelligence makes a difference

In the traditional, industrial society, organizations create value by leveraging mass-production technology and inexpensive labor, which migrates into cities from rural areas. In this society it is the use of industrial technology and the competitiveness of labor cost which makes the difference. As we enter the post-industrial information society, organizations generate new value by leveraging the knowledge of people. Unique knowledge makes a solid difference in characterizing their services. Today, software is embedded in many things and processes, and IT empowers people to create new knowledge, fuelling growth.

In a digital society, AI is advancing to learn from massive data and generate insights. A key difference between the digital society and the post-industrial information society is volume of data. Data can be created and associated with virtually anything – whether that is a person or an object or a process. So for almost any activity or transaction, we can capture a set of data that can be interrogated and analyzed. Now, intelligence makes a significant difference for any businesses and public services.






It is important to think how you can augment the creativity of your people with data-driven intelligence. Similarly, how can you acquire relevant data and prepare it for a machine learning process? Furthermore, intelligent algorithms can be used through the cloud or even embedded in a variety of products and services. How can you design your products and services incorporating such intelligence?

## Connectivity changes the way of business

As things and processes are increasingly digitalized and connected to networks, transaction costs will continue to drop to near zero-marginal costs. Organizations will benefit from connecting their internal operations from end to end – in fact it will become requisite. Furthermore, it will be far easier to connect external services through digital interfaces. Digital systems leverage connected architectures built through digital interfaces called Application Programming Interfaces (APIs). This is happening in many sectors already, for instance financial institutions and Fintech start-up companies are connecting their services through digital interfaces to build innovative services. The borders of existing industries are becoming blurred. This could mean more new entrants from totally different fields. Similarly, organizations are becoming more open. We could see some disintegration of functions, leading to a more distributed business model.

It is important to ask how to connect your entire business processes digitally, and how you could leverage external digital services. Which adjacent industries can augment the value of your products or services?

## Everything from the customer's viewpoint

Digitalization also demands us to shift our viewpoint from supply-side to customer-side. Digital has enabled our customers, either consumers or business users, to directly search vast amounts of information available on the web. They can acquire more relevant information through their social connections. Users even proactively participate in making products and services. We see for instance in users of music platforms curating and sharing content. Or by sharing data which can be used to make better services, for instance connected cars. Digital transformation naturally orients around the experience and values of individual customers. As a result we are seeing the emergence of organically shaped digital ecosystems. Multiple organizations across different industries co-create new value-enhancing experience for individual customers by orienting around the delivery of outcomes. We call these ecosystems Digital Arenas. Shared platforms play a critical role to connect and host ecosystem partners.

Again it is important to ask what your value is and how you position your service in a Digital Arena. It is also critical to examine if you could make your product or service a customer-experience platform for attracting new partners and users.

# Transformation toward Digital Arenas

The forces of Digital, characterized by intelligence, connectivity and customer-orientation, are transforming industries into Digital Arenas. Let's look at transformational impacts to manufacturing, financial services and retail industries as examples.

## Manufacturing

How will digital transform manufacturing industry?

> *Shanghai Instruments and Electronics Associates (Shanghai INESA), a provider and operator of Smart City integrated solutions chose Fujitsu as their co-creation partner. We are jointly setting up a smart factory. The company uses Fujitsu's Intelligent Dashboard to visualize and analyze all the data related to production and the consumption of resources in the factory. This produced significant outcomes including 25% increase in productivity and 50% decrease in production running time.*[*12]

Connectivity and intelligence are transforming factories into smart factories. IoT enables us to connect machines, facilities and processes, and collect real-time data. Data analytics allows factory managers to understand the status of their entire operations in real time, for improving productivity. Furthermore, we can create 'digital twins', virtual representations of machines and processes the factory floor, enabling in-depth insights and simulation. AI will generate insights such as forecasting demand, predicting machine failures, and optimizing production plans.

Products are increasingly digitalized and software controlled. For example, some shoes and shirts already have sensors, connected to networks for monitoring vital data. In the near future, intelligent algorithms will be embedded into products – even tiny ones. What manufacturing industries deliver is dramatically changing from the value of products to the value of *using* products. In other words, outcomes delivered from using products matter most. As a result, the border between manufacturing and service is being blurred. Companies which manufacture products for business use can be transformed into innovative service providers. They will be paid for how much outcomes their products have delivered, for instance, reducing their customer's operational costs. Consumer goods manufacturers will engage with each customer, design personalized products digitally, and produce them rapidly at a smart factory. Leveraging IoT, they will be able to continue to provide smart services after delivery.

Manufacturing companies will increasingly partner with companies in adjacent industries to co-create greater user experience and more valuable outcomes. A product could be transformed into a platform for many ecosystem partner services. For example, a car is becoming an intelligent software based mobility platform. It will provide users with all sorts of features, even taking care of their health conditions.

## Financial Services

Financial services are probably one of the most advanced industries when it comes to digitalization. However they may even yet have the most potential. In capital markets, sophisticated algorithm trading is already commonplace. Data-driven intelligence is being applied to a broad range of tasks in finance. Intelligent robots advise on investment portfolios, recommend insurance policies, and evaluate credit applications. Voice recognition enables fraud detection. People will enjoy naturally spoken voice interfaces for financial transactions.

But it also means financial industries really need a new type of digital workforce, who can create new ideas, agilely develop digital services and leverage open innovation. Digital connectivity is changing the structure of retail finance. New Fintech entrants offer innovative services such as mobile payment, peer to peer financing, or Blockchain transactions. These new services certainly pose disruptive challenges. But many banks have already been proactively connecting and embracing them through APIs, offering alternative services to their users.

Digital will accelerate a shift toward realizing more personalized financial services. We believe Digital Arenas for providing trust and assurance will be organically shaped around people's needs.

> *Fukuoka Financial Group is a regional bank located in Kyushu, Japan. The Group is establishing a service platform it calls 'iBank' to deliver a personalized mobile banking user experience. It has chosen Fujitsu as a co-creation partner to build a cloud platform to enable mobile services and connect various Fintech services. Furthermore, the group is shaping ecosystems to share data and energize regional businesses and communities.*[*13]

Digital forces will connect financial industry and other industries for creating innovation. For instance connected cars and connected healthcare will enable more personalized insurance.

*12 For details please see Book 2 page 26
*13 For details please see Book 2 page 24


## Retail

For the retail industry there are enormous opportunities to use digitalization to transform customer experience.

> *S Group is a Finnish network of companies operating in the retail and service sectors. One of its subsidiaries is ABC Petrol, which provides fuel and retail outlets in over 400 locations in Finland. Fujitsu collaborated with ABC to integrate its mobile application with Fujitsu's POS system. The solution enabled seamless customer experience. When customers drive up to the station, the app shows the available pumps, customers select the number they want to use, step out to fuel the vehicle, put the pump back and are free to drive away. Over 600,000 customers have downloaded the ABC app and transactions have increased five-fold in eight months. "Our clientele loves it and the feedback has been fantastic," commented Antti Erikivi, Supply Chain Director of ABC.*[14]

Digital connectivity can enable unified experience between physical stores and digital spaces. Analysis of customers' in-store location data allows retailers to optimize staffing allocation and store layout. Fujitsu offers a solution that enables this. Furthermore, real-time location data would enable context-aware personalized services, delivering most relevant information at the right location and timing. Data-driven intelligence could allow retailers to understand individual customers better, and use insights to tailor services. When are they likely to come next time? What might they want? What might they want that they don't know they want? In addition, virtual reality and augmented reality technology will take customer experience to a different dimension.

Retail industries are connecting with other industries to shape Digital Arenas for consumer value. Retail, mobile payment, public transportation and others have already created Digital Arenas for delivering better personalized customer experiences. For instance, digital technology such as palm-vein biometrics enables ubiquitous cash/card-less payment for retailers.

*14 For details please see Book 2 page 38

# Digital Co-creation

## Digital Co-creation

Organizations must see co-creation as extending value-creation out beyond their traditional boundaries. Digital Co-creation is a journey. But it is easy to get lost. It requires leadership and organizational commitment.

The first step is to think about the disruptive vision for your organization. It is necessary to revisit what value your organizations will deliver for your customers. It is also crucial to evaluate what disruptive impacts the forces of digital will give to your industries and your business. How could data-driven intelligence change the rules of the game? How could connectivity disintegrate and reshape your business structure?

The next step is to think about how you want your business model to change. Which adjacent industries could be involved for realizing joint value and customer experience? How could you position your products or services in a Digital Arena? Do you play the role of platform or an ecosystem partner? Which key enabling digital technologies can you leverage?

The third step is to implement your digital business architecture thinking about 5 layers: customers, ecosystem, workforce, processes and technology. It is important to view these layers from the flows of data and connectivity.

### Customer layer:

How could digital help connect your customers? How could you leverage customer's data, such as transactional records, social media and others, while protecting their data security and privacy?

### Ecosystem layer:

Which ecosystem partners could provide data or data-driven intelligence, relevant to the customer experience value you want to realize? How could your organization interface with these partners?

### Workforce layer:

How could your organization empower your people with data-driven intelligence? How could your people co-work with external partners or participate in communities? What kind of co-creation workplaces could your organizations provide?

### Process layer:

How could your organization digitally connect your operations, collect and accumulate data for generating insights? What kind of data governance and security rules are necessary?

### Technology layer:

How could your organization build an IT platform (we call it a digital business platform) to connect processes, people, ecosystems and customers, to create intelligence from data, and empower your workforce? It is crucial to provide security for all layers. It is also important to align and connect your existing IT system to reduce complexity and generate value. To this end, modernization of your existing IT systems may be necessary to meet your digital requirements.

A design approach is useful for guiding each step. Organizations could start small with a PoC and move to a fully-fledged digital business, expanding into shaping ecosystems in Digital Arenas.

## Summary

- Begin with a disruptive vision of your organization.
- Design your business model, factoring in intelligence, connectivity and customer orientation.
- Implement your digital business architecture thinking about 5 layers: customers, ecosystem, workforce, processes and technology.

# 5 layers to design digital business

# Digital Society

We are facing serious challenges everywhere in the world. Digital technology has a critical role to play in solving them. To realize a sustainable world, we need to design greater alignment of business with the shared goals of society.

# What will our future society look like?

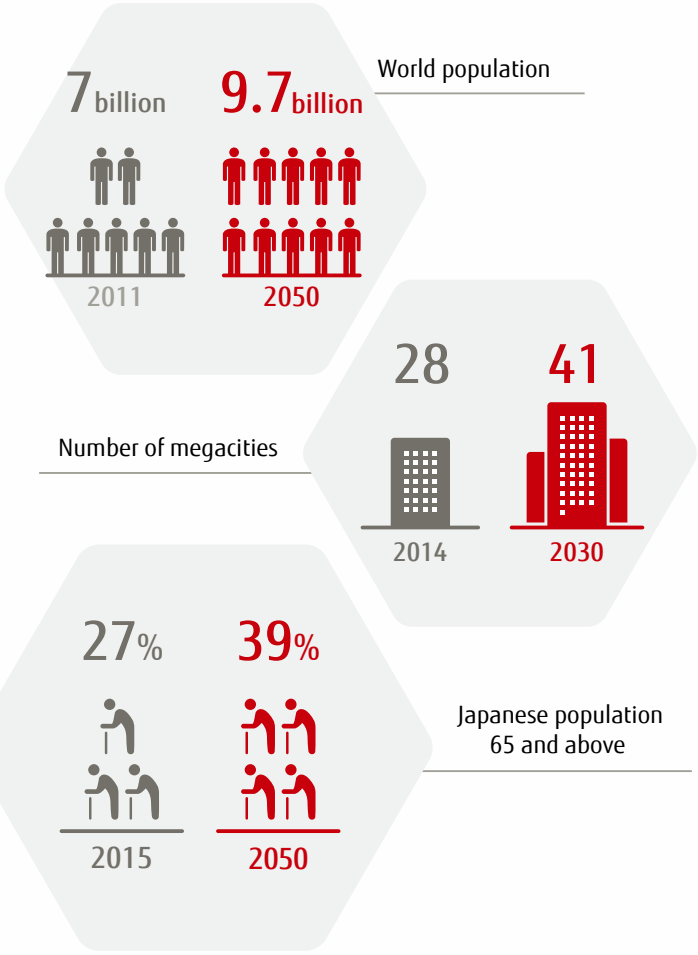
How will our society change over the next couple of decades? What are fundamental forces behind the change? What are our common challenges?

The world population surpassed 7 billion in 2011 and is expected to reach 9.7 billion in 2050.*15 At the same time, massive numbers of people are moving to cities to work and for a better quality of life. The number of megacities with 10 million or more population is estimated to rise from twenty-eight in 2014 to forty-one in 2030.*16

Many of these new, big cities will be in Asia, South America and Africa. Globally, the gravity of economic activity is shifting from the North to the South. This is good news for the global economy because new demand will be generated as a result. But these cities also face difficult challenges of urbanization, including congestion, increasing pollution, energy constraints, security of food and water supply, and resilience to natural disasters.

Contrast this with what is happening in developed countries. Many cities in Japan and Europe are experiencing a decrease in population, which is posing serious challenges of sustainability. In addition, people are living longer, as we saw in Chapter 1.39% of the Japanese population is forecast to be over 65 by 2050. *6 This also means an increasing burden of pension provision and healthcare insurance. This issue of an aging population is not limited to developed countries, either, but to many countries in the world.

Other things are changing. The world is becoming hyper-connected. Global flows of people, goods and capital continue to increase. Take a simple product like a cup of coffee. It has come on a long and complex journey from its origins in an equatorial plantation, traveling through multiple intermediaries to its point of consumption. Smart phones, consumer electronics and cars have even more complex supply chain histories. The internet and smart mobile devices are connecting billions of people and processes. Today, IoT is connecting sensors, any kind of devices and physical infrastructure, producing massive amounts of data. What is coming next? Blockchain, an emerging new technology, has the potential to realize peer to peer trusted transactions instantly at a near-zero marginal cost anywhere in the world. But there are big challenges. Society is threatened by intensifying cyber-attacks. The number of security incidents continue to rise. Our privacy is at the risk of extensive commercial use and censorship for national security reasons. The opportunity exists to create a world where everybody can access and transact with anybody, anything and any information at their fingertips. But we may equally end up in the gloomy scenario of a world that is disconnected under the pressure of cyber terrorism.




*15 United Nations " World population projected to reach 9.7 billion by 2050" 2015
*16 United Nations " 2014 Revision of World Urbanization Prospects " 2014

# Responsible Business

## Aligning business and society

What would it mean if we all could live healthy and fuller lives? What if we could continuously generate innovation? What would it be like eliminating congestion in fast growing cities? What if we could make cities more resilient to disasters? Or reverse climate change? What would it mean if we could greatly improve agricultural productivity?

If we want a better future, the starting point has to be to ask ourselves what kind of future we want. If we want to transform society, we must center our vision around people. This is an undertaking that should not be left only to governments and the public sector. The business world is a major part of society. Companies, especially global ones, have a responsibility to the widespread communities they and their ecosystem partners belong to. Global companies increasingly can have as much influence as individual governments. Therefore, it is becoming increasingly important to align business goals and shared goals of society.

To help address the world's difficult social challenges, the United Nations set out 17 Sustainable Development Goals (SDGs) and 169 targets in 2015. These are shared goals to be achieved by 2030. As well as governments many enterprises have also embraced these goals and already started to work toward them. For example, well-known companies like Shell, Unilever, Coca-Cola and IKEA are committed to supporting the initiative. According to PWC, 71% of enterprises are already planning how they will engage with the SDGs. 41% of them say they will embed SDGs into their strategy and the way they do business within five years.*[17]

Fujitsu is also supporting the initiative, working together with partners. In March 2017, for instance, Fujitsu made an agreement to collaborate with the Global Centre for Disaster Statistics (GCDS), which the United Nations Development Programme (UNDP) and Tohoku University jointly established. Under this scheme, Fujitsu will voluntarily contribute to developing and managing a Global Database for disaster statistics for four years. It is estimated that the aggregated annual loss resulted from natural disasters could amount to 520 billion dollars globally.*[18] However, as there are no globally consistent statistics available, it has been difficult to use data for planning and executing actions. Having a globally consistent statistics database around disasters will help visualize the data, apply the acquired insights for developing actions, and monitor effectiveness. In this field, Fujitsu is collaborating with many institutions to mitigate damages from natural disasters. For example, we developed a solution to fast simulate estimated impacts of Tsunami, and a disaster information management system leveraging smart phones.

## A Human Centric Intelligent Society

Digital technology has a foundational role to play in solving difficult global challenges. Data-driven intelligence could help us to find better ways to take effective measures to minimize the impact of disasters, as well as to conserve energy, avoid congestion, reduce greenhouse gas, and reduce food waste.

The digital era is seeing the explosion of global data. How could we exploit these vast amounts of data? Digital connectivity will change the way our society works. For instance, we will be able to digitally connect cars, roads, bridges, railways, and even ships. What this means is we can not only make things more efficient, but target all sorts of other values too, like minimizing harm to the environment or enabling greater convenience. Digital will change our viewpoint from the supply-side to the people-side. As we saw in Chapter 2, these high value services will be co-created by ecosystem partners and by people themselves across a variety of Digital Arenas.

Fujitsu believes technology will empower people to build a safer, more prosperous and sustainable world. The forces of digital, including intelligence, connectivity and people-orientation, will transform our society, with interconnected Digital Arenas, delivering the needs of people more efficiently than we could imagine. We call this a Human Centric Intelligent Society. It is a new and emerging digital society, where people, enterprises and public services co-create innovative value to achieve the common good of society.

## Individual aspiration drives business and society toward a shared goal

Tatsuya Honda, a 'super creator' awarded by the Information-technology Promotion Agency of Japan for 2014, was inspired by his unique personal goal. He said, "Meeting people with impaired hearing in my freshman year opened my eyes to a soundless world. It drove me to create a technology to help them, allowing them to feel the shapes of sounds." Honda developed "Ontenna", an innovative device which enables the hearing-impaired to sense characteristics of sounds through light and vibrations in their hair. The device borrows the same concept as cat's whiskers, which can sense delicate flows of air. He joined Fujitsu's design team, and is focused on making this innovation a success. Honda's aspiration, Fujitsu's business and society's need are aligned. This is a small example of working toward a world where "no one is left behind", that SDGs are aiming at.

*17 PwC "Making it your business: Engaging with the Sustainable Development Goals" 2015
*18 The World Bank 2016

# Working on shared goals

How could we co-create a better world leveraging the transformational power of digital? Let us have a look at some transformational scenarios, where emerging Digital Arenas are driving social value and better experiences for people. Here are three areas where Fujitsu is aligning to UN SDGs.

## Everyone living fuller lives


SDG3 Well-being (Ensure healthy lives and promote well-being for all at all ages)

It is good news people are living longer on average, but we must ensure *everyone* lives a healthy life. Every year in the world, 6 million children die before their fifth birthday. How can digital innovation promote dignity and wellbeing?

Data-driven intelligence has a great potential for delivering transformational outcomes. As we saw in the case of San Carlos Clinical Hospital in Chapter 1, an AI-based system was able to learn from a huge volume of clinical records and other research data, and use this to generate insights to help doctors to make clinical decisions tailored for individual patients. AI and supercomputer simulation are enabling much faster discoveries of chemical compounds effective for treating cancers and other difficult diseases. It is also possible to analyze genomes and other data such as lifestyle activities to enable preventive and individualized medicine. We can also use computing simulation for creating digital twins of our own bodies. For instance, the University of Tokyo and Fujitsu jointly developed a heart simulator, which can visualize the motions of 640,000 muscle cells.

Digital connectivity could transform how healthcare and other care services are delivered. It could realize truly human centric care for the wellbeing of individuals. Cloud and IoT can help us connect people, clinics, hospitals, drug stores, advanced medical institutions and others for sharing data and providing personalized services. And security services are critical for ensuring that value comes out of the data without compromising people's privacy. For example, Fujitsu has already provided regional healthcare networks linking about 7,000 hospitals, clinics, elderly care and other related facilities in Japan.

## Sustainable city


SDG11 Sustainable City (Make cities and human settlements inclusive, safe, resilient and sustainable)

A city is a living thing. It comprises many different kinds of activities and functions, which are all interconnected. It is in a continual state of dynamic transformations in response to environmental changes. Today, more than half of the world's population lives in cities, and this ratio is ever increasing. Cities are facing difficult challenges everywhere. How can we use the forces of digital to make a positive impact?

We believe the answer is to co-create human centric services among stakeholders, in both the public and the private sectors. In Singapore, Fujitsu has been collaborating with the Agency for Science Technology and Research, and Singapore Management University. We are developing a unique solution to deliver convenient and stress-free urban mobility, leveraging data-driven intelligence and digital connectivity. This context-aware solution is designed to predict congestion of public spaces and public transport, and make intelligent interventions at precise moments to ease it. For instance, it can send targeted mobile coupons to motivate people into different behaviors – shopping in a nearby shopping mall. The system

can ease congestion in real time. A field trial achieved good results at optimizing the flow of people right after a major sports event.

This small example shows how a Digital Arena can come together to create value for citizens at scale. Digital technology enables us to see multi-layers of urban activities in real-time at a glance. How are people moving? How are businesses running? How is traffic on roads and railways changing? How and where is energy demanded and supplied? Where are crimes happening? How are environmental pressures developing? Where are we facing risks of natural disasters? We have an opportunity to combine some of these data and generate insights. Data-driven intelligence will empower us to predict how the things could develop and make better decisions.

## High-productivity agriculture


SDG2 Food and agriculture (End hunger, achieve food security and improved nutrition and promote sustainable agriculture)

Food and agriculture is one of the big untapped fields which technology could improve. In many countries, people are still growing food in the same way they have been doing for generations. In spite of food shortages in many places, incredibly, 1.3 billion tons of food, roughly one third of global food production is lost or wasted every year. How could we supply food securely? How could we transform agricultural productivity significantly? How could we reduce food waste?

Data-driven intelligence and digital connectivity could completely transform the way that food is grown and distributed. Fujitsu is providing an agriculture cloud service, we call Akisai, to over 350 organizations in Japan, and expanding it in Korea, Vietnam and other countries. This solution effectively digitalizes agricultural knowledge allowing even inexperienced farmers to grow food efficiently. Fujitsu is also operating a precision agriculture factory, powered by IoT, in Japan as well as in Finland.

A big opportunity comes from enlarging this Digital Arena. Fujitsu is working to connect farms, seedling companies and other ecosystem partners to co-create agricultural innovation. Furthermore, by digitally connecting farms, logistics, food companies, retailers as well as individual consumers, we could have an opportunity to optimize demand and supply, leading to reductions of wastes at each stage.

In addition to these, Fujitsu is also working to provider better education, respond to climate change, and promoting industrial innovation.

## Summary

- Align your business goals with a shared goal of society.
- SDGs provide good directions. Creatively apply digital technology to solve a big social issue.
- Work with partners in a Digital Arena toward a shared vision.

# Your co-creation partner

## A trusted partner

How can you choose a co-creation technology partner? In our survey, business leaders told that they want to work with partners that have "digital technology capability". But they also named "understanding of their industry and business requirements", "alignment with their vision and strategy", and "trust for collaboration" as similarly important expectations of their partners.

Throughout our 81-year history, Fujitsu has been working alongside countless numbers of customers, delivering innovation. We developed a wide range of telecommunications and computing products, including the fastest supercomputer in the world and other cutting-edge technologies. Leveraging these, Fujitsu has successfully delivered solutions and service to solve the challenges of our customers. Particularly, we have been supporting mission-critical social infrastructure for customers across the world, such as banking systems, stock exchange trading systems and public network systems. To do so, we relentlessly pursue the highest quality so that our customers can have total confidence in everything we do.

Fujitsu values trusted relationships with our customers, understanding their goals as well as their challenges. This is how we have responded to their expectations. Our 156,000 people in the world are working for our customers in the spirit of "shaping tomorrow with you".

## Technology for the future

What technology do we need to realize digital transformation for society? What technology do you need to embed into your business core?

To realize growth in a digital society, we need a different style of technology. It is a style of technology that connects everything. It learns data and generates intelligence. And it empowers people to make better decisions. To enable all of these things, Fujitsu is committed to strengthening four critical technology areas: AI, IoT, Cloud and Security. Bringing these technologies together, we provide unique digital services to allow our customers to gain insights from data, achieve tangible business outcomes, and realize better experience for their customers. We call this Connected Service. And it is enabled by our digital business platform MetaArc. You can find more details about our technologies and services in Book 2.

Digital is leading all of us to a different future. Fujitsu will leverage our digital technology architecture and our long experience in working with organizations in a wide spectrum of industries, to provide the very best value for our customers. Fujitsu wants to be your digital co-creation partner, together delivering unique human centric value to help you thrive in a digital society.

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April, 2017
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FUJITSU

# Fujitsu Technology and Service Vision 2017

Book 2

shaping tomorrow with you

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# Technology in the Digital Era

## Digital Disruption

According to a global survey by Fujitsu, 89% of business leaders confirmed they have implemented digital transformation, and 34% of digital transformation projects have delivered outcomes.*1 Digital transformation is already producing business outcomes.

But this is only the beginning. The implications of digital are not just that organizations will transform but industry structures will also change as a result. In our survey, 75% of the respondents believed that their industry sector will fundamentally change within the next 5 years.*2 In addition, more than half indicated that their own organization will not even exist in its current form by that time. Digital technology has the power to transform the structure of enterprises and industries.

## Value of Digital Technology

What is digital technology? How is it different from existing IT? Traditional IT systems are established by converting manual activities into executable software. They process data to drive efficiencies and productivity. In contrast, digital technology is designed to connect everything, learn from data and create insights. It results in bringing direct outcomes for business and society. Digital technology allows people to work more creatively. Digital insights also enable organizations to operate more productively, increase customer satisfaction and strengthen their product competitiveness. By introducing digital technology into the core of business, every business is becoming a technology company.

Digital is bringing powerful new capabilities in business and society. For example, in Madrid in Spain, Fujitsu collaborated with the Institute of Sanitary Research of the San Carlos Clinical Hospital.*3 Together we developed an AI system, which could accurately assess a patient's health risk by learning from a very large volume of past clinical records and open data such as medical research papers.

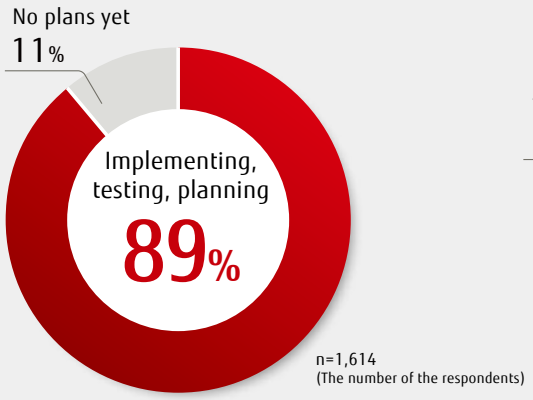
## Digital Co-creation

In order to drive digital transformation, organizations need to take a new approach. Digital Co-creation means blending your business expertise with digital technology, and creating new value with ecosystem partners and customers to shape a different future.

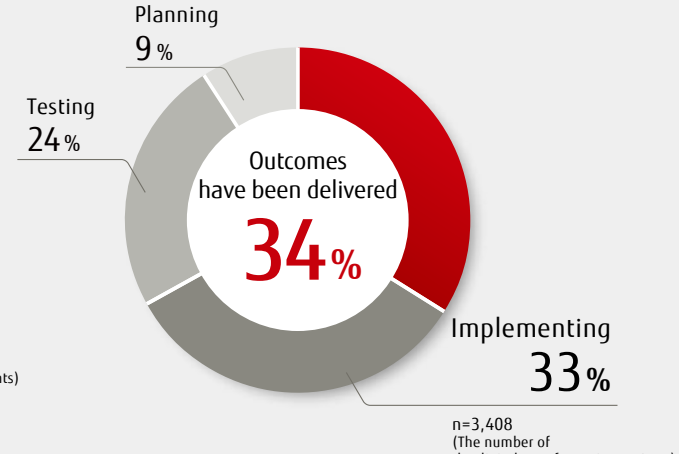
In 'Fujitsu Technology and Service Vision: Book 1', we introduce how business leaders can adopt co-creation initiatives to deliver outcomes.

In 'Book 2', we discuss a digital technology framework that technology leaders could consider for Digital Co-creation, along with Digital Transformation success stories and enabling technologies. We hope this booklet provides you with the insights you need to lead digital transformation.

**Have you started digital transformation?**




**What is your progress with digital transformation?**




*1 Using an independent research company, Fujitsu conducted a survey in February 2017. We received responses from 1,614 C-suite executives and business decision makers in 15 countries around the globe.(http://www.fujitsu.com/global/vision/)

*2 Fit for Digital: Co-creation in the Age of Disruption(http://www.fujitsu.com/global/about/resources/publications/digital-disruption-report/)

*3 For details please see page 22 "Revolutionizing the clinical decision-making using artificial intelligence" The Institute of Sanitary Research of the San Carlos Clinical Hospital/Hospital Clínico, Madrid

# Connected Services for Digital Co-creation

Business leaders are expecting that digital technology delivers business outcomes.
To maximize the value of digital technology, digital leaders need to take a completely new approach.

# Technology Leaders Agenda

In the age of digital disruption, what are the priorities for technology leaders? How can you overcome the challenges of digitalization in order to deliver the benefits? We believe successful digital transformation comes from three key principles: **skilling and investing in people, building the right technology architecture, and taking the right approach.**

- As we introduced in Book 1, our global survey showed the most critical inhibitor of digital transformation is the lack of talent with the necessary skills. What kind of new skills are required for technology people in your organizations?
- Digital technology has a different nature to traditional IT. It can drive new connections with customers or provide new business insights. It requires technology leaders to set out a new technology vision and strategy. How do you determine the key characteristics of new digital technology architecture?
- As the world becomes more connected, more open and more borderless, Digital Co-creation is the best way to deliver transformation. How do you work with external partners to enable an ecosystem?

Let's look at these points.

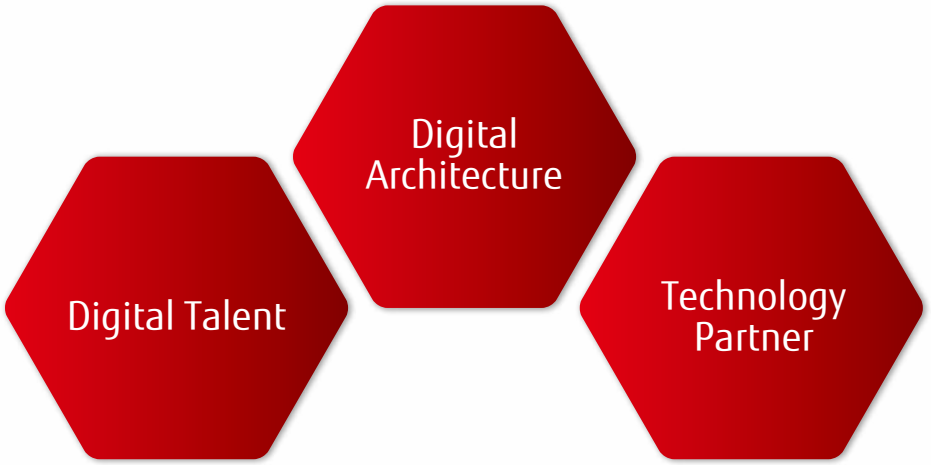
## Digital Talent

In our survey, we asked what skills were the most important for people to develop and improve in the digital era. The respondents chose 'professional knowledge of digital technology', 'creativity and imagination' as well as 'industry and business-related professional knowledge' as the key skills. Digital requires a distinctly different style of work. Digital technology connects everything, bringing together data, and learning from data to create insights. Therefore putting a greater focus on handling data is a key, both in terms of individuals' skills and the organizational strategy. Data scientists are already in high demand. Beyond this, to exploit potential from AI requires new skills in writing algorithms, in preparing data for machine learning and deep learning, and in tuning and training AI. At the same time, these processes must be secure. Organizations must ensure they have the right data security expertise and organizational data security.

Digital demands that we work in a different way with agility. Instead of dealing with fixed requirements and static system parameters, digital engineers work more conceptually, beginning with a desired business outcome and creating a technology concept to deliver it. They prototype a solution by bringing together appropriate digital services in an agile manner. This approach not only calls for digital programming literacy, but also for creativity. A design thinking framework is an essential tool to enable this. We will cover this more later.

Lastly, we think technology people need to be much more closely aligned with business requirements. Digital engineers are expected to deliver direct business outcomes. This means that they need to have a basic level of business literacy – how the business works, how customer experiences are created, and therefore how they could be improved, and how business can increase revenue.

Organizations have several ways they can achieve this. They can invest in acquiring new talent, they can educate existing people and they can exploit a technology partner's expertise. Fujitsu will open our Digital Business College in Tokyo in July this year. This institution is designed to help organizations to acquire new skills for accelerating digital transformation. We offer training courses in AI, analytics, security and design thinking in physical classrooms as well as online.



# Connected Services

## Digital Forces

As we discussed in Book 1, digital technology has three transformational forces. First, data-driven **intelligence** allows you to do powerful things and make a difference. AI plays an increasingly more important role in learning from massive amounts of data. Insights and predictions can be delivered by AI to help people make better decisions, and make your products and services more competitive. Therefore, organizations should establish a data strategy and plan how they can use AI to create value out of data.

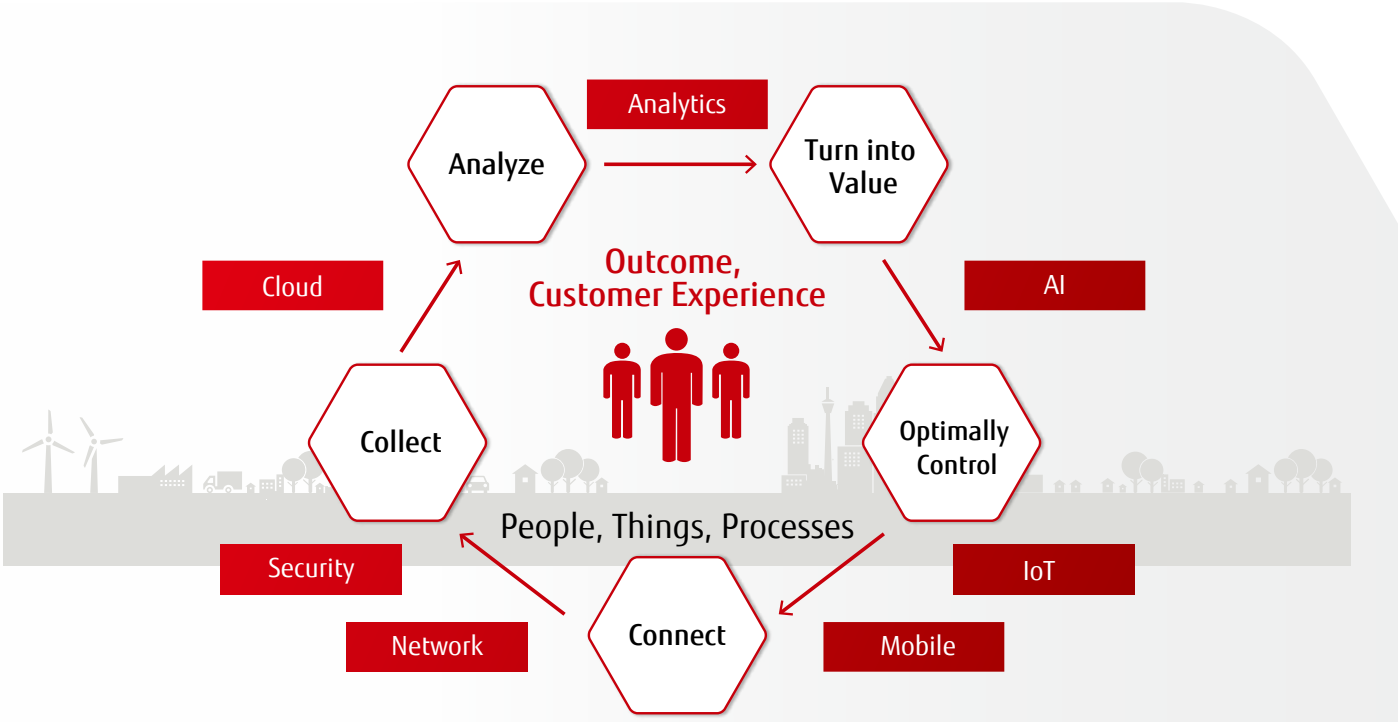
Second, **connectivity** changes the way business works. Today, IoT enables organizations to connect not only people but also countless number of things and processes, generating large amounts of data. Organizations can leverage Applications Programming Interfaces (APIs) to connect internal operations as well as connect services of external ecosystem partners. It gives you an opportunity to publish APIs as well as to use other parties' APIs to mash up new services for customers.

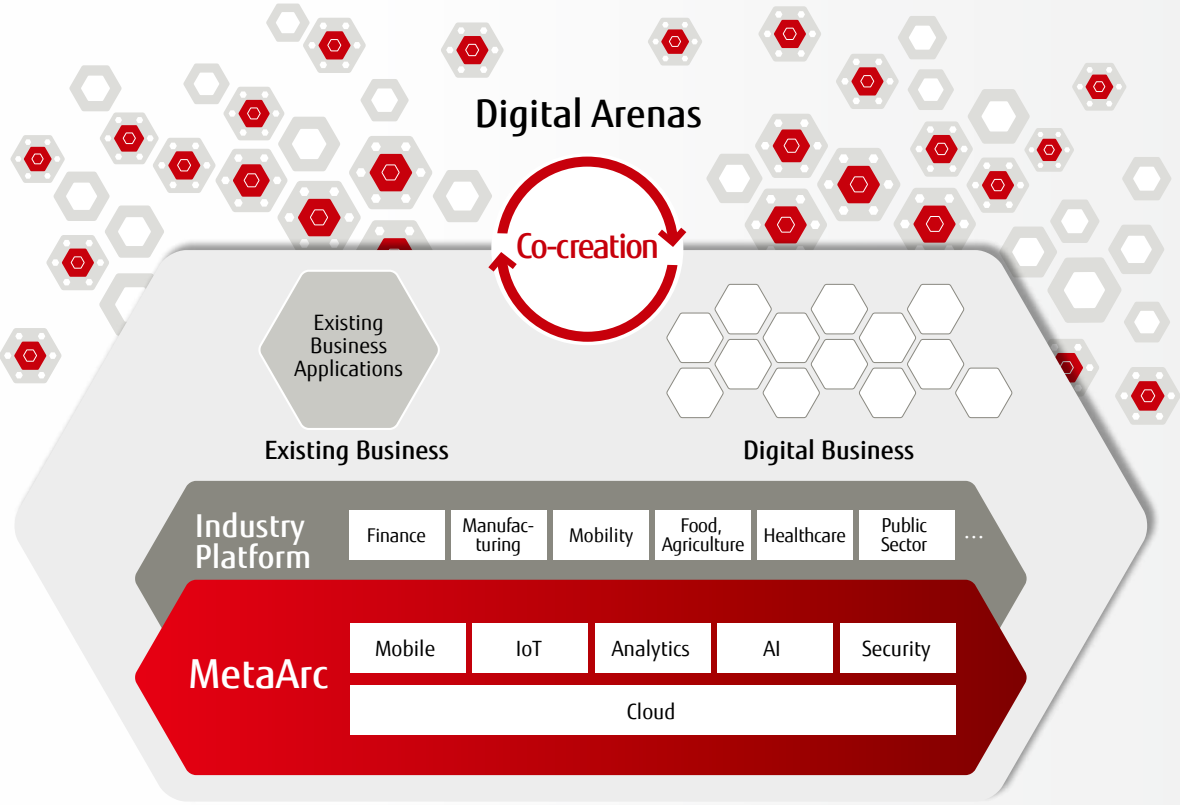
Third, digital naturally orients organizations towards delivering **personalized value for customers and citizens**. Data-driven intelligence and connectivity allow organizations to understand individual customers more deeply and provide better, more tailored customer experience and outcomes.

## Connected Services

To exploit value from digital technology and realize better customer experience as well as outcomes of business and society, organizations need to bring together data-driven intelligence and connectivity. Connected digital technologies enable a cyclic process of value creation: connect everything, collect data, analyze the data, create value, and optimally control the process. Fujitsu's technology strategy is to provide **Connected Services** to enable our customers to create value securely in exactly this way. And this is a vital foundation for connecting our customers and ecosystem partners beyond the borders of existing industries, to co-create innovative value. Connected Services are designed to leverage connectivity and data-driven intelligence to empower people, delivering truly human centric value.

To realize this, it is crucial to combine key digital technologies, especially AI and IoT, on a cloud-based platform securely. Security must be provided throughout the value creation process. Fujitsu offers our customers platform services to meet the needs of various industries and emerging digital ecosystems.






# MetaArc

Fujitsu's MetaArc is a Digital Business Platform designed to enable Connected Services. MetaArc is a comprehensive framework which connects people, things and information across the boundaries of organization, company and industry. MetaArc delivers the following added value.

1. Delivering digital technology as a service
   Using Cloud Service K5 as a base, MetaArc delivers digital technologies like AI, IoT and Mobile, as a service to allow customers to develop and run a value creation cycle in an agile way.
2. Providing Industry Platform Services
   MetaArc enables platform services specific to vertical industries such as Finance, Public Sector and Manufacturing as well as common services for billing and user management. By composing these services as APIs, organizations can deliver new industry-focused digital services with agility.
3. Connecting existing IT systems seamlessly
   Combining Fujitsu's long experience in delivering mission critical IT systems and our strong digital technology, MetaArc enables a controlled Hybrid IT environment for both existing business and new digital services. It also provides smooth cloud migration services.
4. Developing ecosystems across industries
   We are using MetaArc as a platform for promoting open innovation among diverse organizations, partners, and startup companies. Fujitsu promotes distribution and use of APIs and digital services among organizations, facilitating the formation of digital ecosystems across existing boundaries, enabling Digital Co-creation.

## Your Digital Co-creation Partner

Fujitsu itself is also on the journey of digital transformation. Besides investing heavily in AI, IoT, Cloud and Security technologies, we are digitalizing our operations. We are migrating all our business IT systems on to our K5, as well as implementing AI in our internal operations. We are confident that these activities will contribute to enriching our digital transformation offerings for our customers.
Fujitsu wants to be your Digital Co-creation partner, delivering Connected Services on the MetaArc platform.
Next, we will introduce Fujitsu's initiatives in industry transformation and workstyle transformation, as well as our key digital technologies provided under the framework of MetaArc.

# Industry Digital Transformation

## Digitalization of Industries

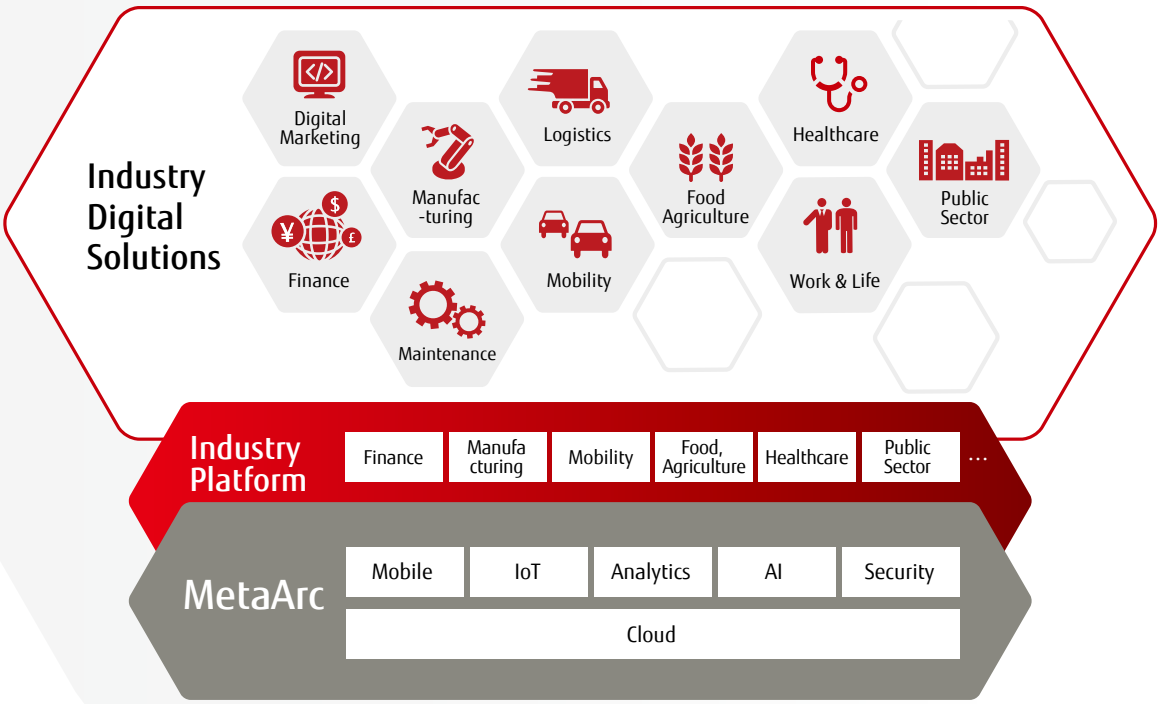
As well as in horizontal functions such as marketing and workplace, digitalization is accelerating in industry specific business services. For example, Fintech innovation is driving transformation of retail finance, and IoT is enabling manufacturing companies to set up new smart factories. In our survey, between a third and a half of the respondents said they have implemented or plan to implement industry specific digital business: 51% of the respondents in the Financial Services, 51% in Healthcare, 47% in Manufacturing, 46% in Transport, and 36% in Retail. Many of these have already seen outcomes from digital projects.

As mentioned in the Book 1, many organizations are bringing digital technology into the core of their business process. With digital technology, organizations are able to create intelligence out of data, differentiate their business, transform their business model by forming an ecosystem, and deliver customized experience unique to each individual customer. This orientation of their business around the customer blurs the boundaries of industries, and creates the digitalized place where customer experience and outcomes are co-created. As we described in Book 1, we call these places Digital Arenas. Organizations need to re-design their business structure for a new world of Digital Arenas. While they keep their core business process, organizations need to connect their services with other services through APIs and mash them up to create new customer experiences in an agile way. In a digital era, the number of effective connections and the strength of the digital ecosystem are the keys for a competitive strategy. The industry platform provides the environment in which a Digital Arena comes into play, and plays a key role in strengthening the connections and the ecosystem.

## Industry Platform

Through our MetaArc, Fujitsu delivers industry platform services for Finance, Manufacturing, Mobility, Agriculture, Healthcare, the Public Sector and others to support customers' digital businesses. For example, Fujitsu provides a suite of financial solutions, we call 'Finplex'. As a platform for the Finance industry, Finplex provides a range of APIs for financial operations and services. These include APIs for intelligently empowering field insurance sales with essential information, an AI-based robot agent (chat bot) to respond to customers' queries, and many others. The combination of these APIs also enables co-creation between financial institutions and Fintech companies, as well as companies in other industries. In addition, Fujitsu played a key role in the establishment of Financial Innovation For Japan (FIFJ) in 2015. This consortium enables new financial services to be co-created by financial companies, IT vendors and start-ups. As of December 2016, 256 companies had already registered with FIFJ.

Fujitsu also delivers other industry platform services such as




SPATIOWL for mobility services using location information and Akisai for smart agriculture. These platforms have been already used by many enterprises and public sector organizations, and delivered various transformational services. In manufacturing, Fujitsu has digitalized our end-to-end operations, converging digital and physical spaces for autonomous improvement in our factories. For instance, we implemented visualization of the entire production processes, automatic inspection by AI-based computer vision, as well as AI-based predictions of production status for productivity improvement. Based on our in-house knowhow, we will provide manufacturing platform services to accelerate co-creation with our customers.

## Creating New Services through Cross-industry Fusion

As the borders between industries are blurred, another approach to strengthen competitive advantage is to drive cross-industry cooperation. To achieve this requires multiple companies to adopt a co-creation approach. Fujitsu works with customers across all industries, and using our industry-based knowledge and technologies, we have developed a new services framework for co-creation. We call this Knowledge Integration in Action. Using this framework, various types of data are collected, ideas are created, and new services are developed in an agile way. By combining knowledge from different industries, a range of new cross-industry services are created.

## Enabling Digital Transformation

Fujitsu has developed a solution showcase for successful digital transformation called Digital Transformation Offerings. This showcase models successful case studies where the latest digital technologies are being used across eight sectors ranging from manufacturing through to digital marketing. It helps customers to identify their transformation needs and to find appropriate solutions. Fujitsu is committed to developing industry-based platforms and ecosystems, facilitating cross-industry co-creation, and helping to transform businesses and society.

# Digital Workforce and Workstyle Transformation

## Changing Role of People in the Digital Era

AI and robots are already widely used to support our business. In addition to labor-intensive tasks, many believe that knowledge-based tasks could be also replaced by AI and robots. In our survey, 65% of business leaders responded that AI will substitute a work of people in the future. At the same time, 82% of the respondents thought that AI will enhance the capability of people. As we expressed in the Book 1, we think the analytical power of AI and the creativity of people are complementary. Digital empowers people to realize previously unimaginable breakthroughs. To do so, people need to reinforce our unique capability of imagination and creativity, while building up literacy in digital technologies.

## Workstyle Transformation

In order to allow people to use creativity and deliver innovation, workstyles of the past must be transformed so that people can focus more time on learning and making connections. By digitalizing workstyles and connecting data using cloud and IoT, potential challenges and solutions in business activities or employee performance can be visualized. Such visualization of real challenges and solutions enables the continuous transformation of workstyles. To achieve this, Fujitsu offers a range of technologies to enable workstyle transformation, including the MobileSUITE platform, delivered under the framework of our MetaArc. MobileSUITE transforms business applications for use on mobile devices and allows organizations to manage these applications efficiently. Fujitsu also offers a line-up of products and Digital Workplace services to support the workstyle transformation of its customers. We have proven these technologies internally through our own workstyle transformation.

## In-house Implementation

In 2014, Fujitsu developed a communication platform for use by our 500 group companies and all employees around the world.*4 By connecting staff across the globe in real time, the system has generated many positive outcomes. These include a reduction in commuting and business travel expenses, and improved worker productivity. Fujitsu's in-house social networking system consists of more than 4,500 communities, providing a platform where employees can interact and circulate different ideas. In April 2017, Fujitsu introduced a new teleworking program to all employees in Japan. Following the establishment of separate teleworking policies by each department, this program allows employees to work anywhere, and enables a very flexible workstyle. This is not limited to office environments; the workstyles of factory and



*4 For the details please see page 44 "Workstyle transformation supported by a Global Communications Platform" [Internal case] Fujitsu Limited

maintenance workers are also being made more flexible by technology. Furthermore, Fujitsu has started implementing AI technologies to automate and modernize internal processes. For example, the deployment of AI in a Fujitsu call center has doubled the closing ratio of calls by newly hired call center operators.

## Human Centric Experience Design

How can we improve people's imagination and creativity to thrive in the digital era? Fujitsu proposes a new approach. It brings together the concepts of Human Centered Design and Design Thinking. This approach helps to develop people and an organization which can continually create new value and innovation. The approach can also be applied to improve relationships with stakeholders, create new business offerings, and identify new ways of using technology.

Fujitsu has systematized this new approach as Human Centric Experience Design, which is a framework consisting of three phases that can be used in many business areas. In the "vision creation" phase, a to-be model is designed through a co-creation workshop and a fieldwork with a diverse range of people. In the "concept development" phase, a practical concept to realize the vision is developed by creating a prototype in a Proof of Concept(PoC). Then in the "business evaluation" phase, a Minimum Viable Product(MVP) is created in an agile way to evaluate the business feasibility.

Each phase in this framework is customized for each project and is supported via a combination of Fujitsu people, methods, tools, technology, and places to deliver a fulfilling experience for those involved.

People

The Fujitsu designers who drive the design approach, the engineers and the business consultants all work together to deliver services.

Methods and Tools

About 80 methodologies, including an interview technique to discover insights and other tools to generate ideas, are available.

Technology

A platform has been created to digitalize workshops and development environments that enable rapid prototyping and evaluation.

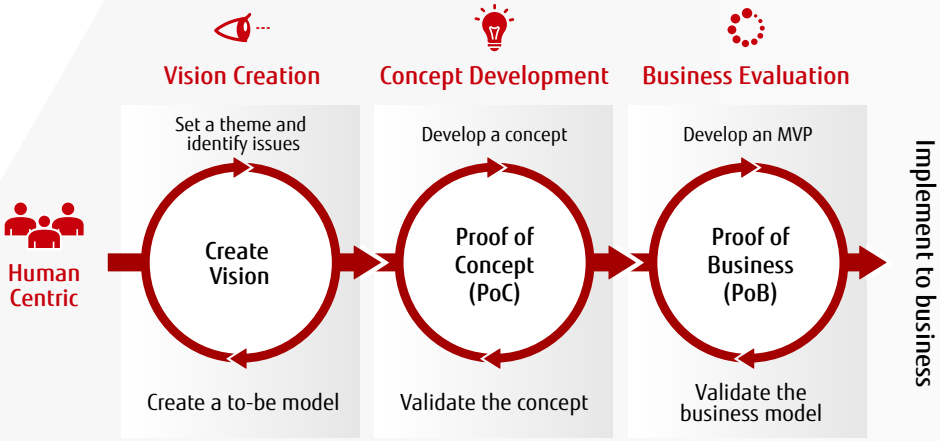
Places

Fujitsu offers multiple co-creation spaces, such as Digital Transformation Center and HAB-YU in Japan, and is also planning to open co-creation spaces in other countries.

## Digital Global Communication Service

In December 2016, Fujitsu launched its Digital Global Communication Service. Based on the knowhow in workstyle transformation gained through its own experience, Fujitsu provides total support from the concept development based on its design approach through to the operation of the communications platform. Fujitsu has strengthened its offerings in workstyle transformation as a result of its internal implementation, and works to transform the digital workforce and workstyle by considering customers' workstyle vision from a human centric viewpoint.

Human Centric Experience Design Framework



# Delivering Business Outcomes with IoT

## Business Model Transformation by IoT

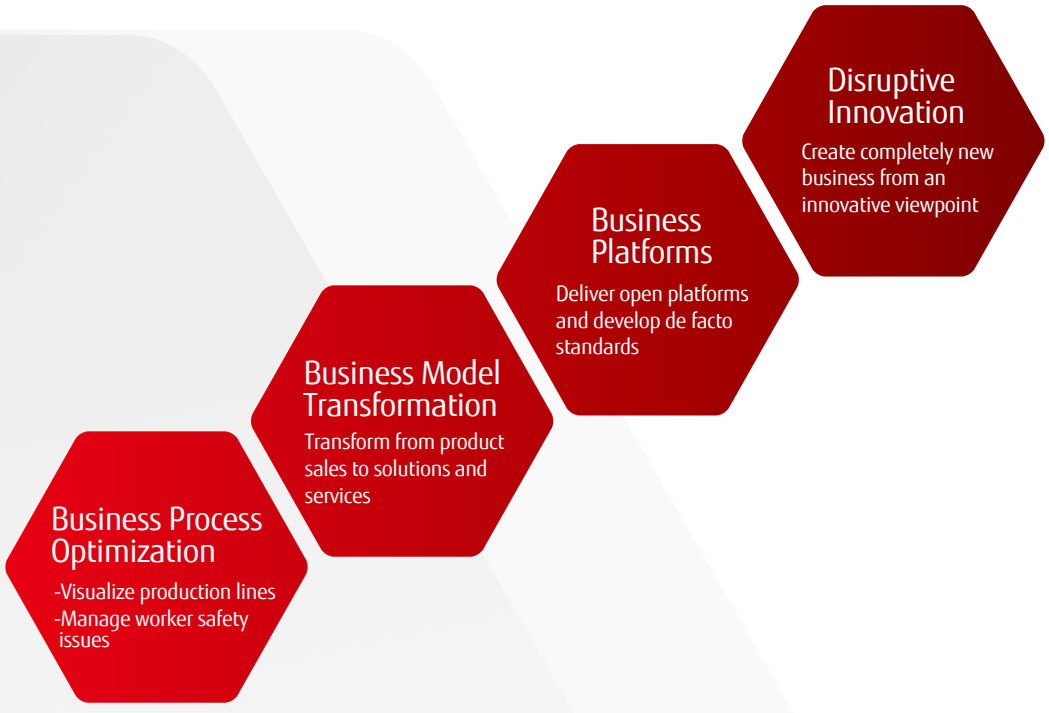
Many companies and organizations have already started to use IoT technologies to connect businesses and services and drive digital transformation, and adoption is accelerating.

How can organizations use IoT technologies to transform their business? A manufacturing company can use IoT technology to connect to the products it sells to customers. By collecting data, the company can transform its business model from just selling products to also include after-sales services. For instance, Optex Co., Ltd. is a Japanese company which develops, manufactures and sells sensors. It now uses the Fujitsu IoT Platform to support its sensor-based solution that provides a real-time water quality testing service known as WATER it.*5 As a result, Optex has expanded its business from selling only sensor products to now offering services like water quality testing. Furthermore, IoT gives businesses lots of data. Analysis of this data can allow a manufacturer to create new value-added services, such as the prediction of machine failure and preventive maintenance services. Furthermore, the combination of its own products with those of other suppliers through the unified data collection mechanism enables maintenance of complete production systems, or even entire factories. Leading industrial machinery manufacturers, such as Komatsu and FANUC, are creating an open-ecosystem by partnering with technology companies to grow their business in new directions. Business applications for IoT are certainly not limited to manufacturing. Connecting to customers through IoT leads to new business creation opportunities. For example, in the construction and transport industries, companies are launching new services around the sharing of construction machinery and business fleets respectively.

## Value Creation by IoT and Challenges in Implementation

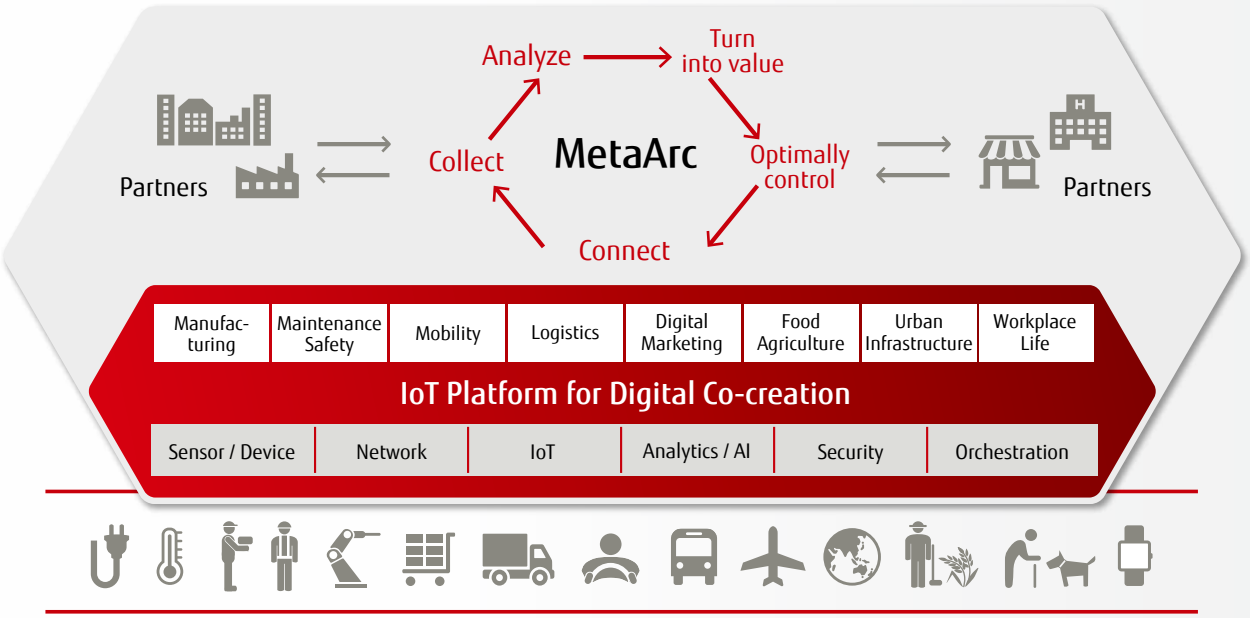
IoT technologies create value through a cyclic process, which is driven by the power of these technologies to collect and exploit data. First connect, then collect, then analyze and finally transform into value and optimize and control.
At the same time, IoT operations bring new challenges. As the use of IoT increases, the handling of the IoT specific network characteristics, such as the vast number of sensor nodes and large fluctuations in the network, become a critical issue. In October 2016, a piece of malware, called Mirai, turned some IoT devices into botnets. Mirai caused damages to the services of Twitter, Netflix and many other prominent companies.
Robust security measures are essential in an IoT implementation and need to be focused around three areas.

1. Vulnerability: The remote update of software on IoT devices
2. Access Security: Access authentication and protection against cyber-attacks.
3. Data Security: Data encryption and anonymization, to protect privacy and confidentiality.






*5 For details please see page 32 "IoT Platform enables rapid development of new services and business model transformation" Optex Co., Ltd.




IoT can deliver powerful business outcomes, but implementation is often complex, and it needs strong IT management discipline applied to maintain it safely after installation.

## IoT Platform for Digital Co-creation

Based on technologies acquired through the development of networks and ubiquitous products, Fujitsu has developed a suite of IoT-related technologies that can enable greater value from an IoT implementation. Fujitsu delivers a total IoT solution covering sensor devices, network and security. At the heart of this is the FUJITSU Cloud Service K5 IoT Platform, provided under the framework of MetaArc. To manage IoT-specific network characteristics, Fujitsu's unique Dynamic Resource Controller technology dynamically optimizes resources on both the cloud and the edge, to efficiently handle device data. Regarding IoT security, the IoT platform remotely delivers the software update function on IoT devices. Data collected from devices is processed securely and efficiently on the IoT platform and analyzed by AI services, provided under the framework of MetaArc. This value creation cycle creates positive business outcomes.

## IoT Services and Solutions for Digital Transformation

As IoT technology evolves and becomes a more mainstream business technology, companies will need to secure the right skills in their organizations to use and manage this technology. The shortage of the right skills has caused many organizations to put digitalization projects on hold. Fujitsu delivers managed services to support the IoT system operation and IoT solutions for industries including manufacturing, maintenance, retail and logistics and mobility to help solve issues in IoT operation and deliver business outcomes. For example, Fujitsu GlobeRanger iMotion enables IoT and Industrial Internet by simplifying the development, deployment, and management of RFID, mobile and sensor-based solutions for industries such as government, manufacturing and distribution.

The possibilities of IoT are truly infinite. By 2022, IoT will save consumers and businesses $1 trillion a year in maintenance, services and consumables.*6 With its Ubiquitousware based on Fujitsu's mobile product development experience, IoT platform, IoT solution and services, Fujitsu contributes to the digital transformation in business and society by IoT.

*6 Gartner " Top Strategic Predictions for 2017 and Beyond: Surviving the Storm Winds of Digital Disruption" 14 October 2016, Daryl C. Plummer et al.

# Human Centric AI Zinrai

## New Technology to Analyze Business Data

Progress in AI technology means that business can start to use it in their operations. IDC predicts that by 2019 AI will be used in 40% of all digital transformation and in 100% of IoT-related initiatives.*7 What are the challenges to adopt AI? How can we use this technology to achieve outcomes? Fujitsu has a strong background in developing AI technology and providing services to facilitate the implementation of AI in business.

Deep Learning has dramatically improved the accuracy of machine learning. However data usable for Deep Learning is currently limited to image and voice data. For example, it has been extremely difficult to accurately classify the widely fluctuating and complex time-series data acquired from sensors built into IoT devices and other sources. Fujitsu has developed a new Deep Learning technology to produce highly accurate results of analysis of time-series data, which is around 25% more precise than existing technologies. In the future, this technology will contribute to managing maintenance tasks at work sites and detecting abnormalities in machinery.

Fujitsu is also developing a new technology known as Deep Tensor to generate new insights from graphs. A wide range of industries generate data that can be graphed in this way, from finance through to healthcare, security and social media. Deep Tensor analyzes graphical data to uncover patterns and abnormalities that people are unable to detect. In the future, among other applications, Deep Tensor will likely be used to predict credit risk in the Fintech sector and to discover new compounds in silico drug discovery and design.

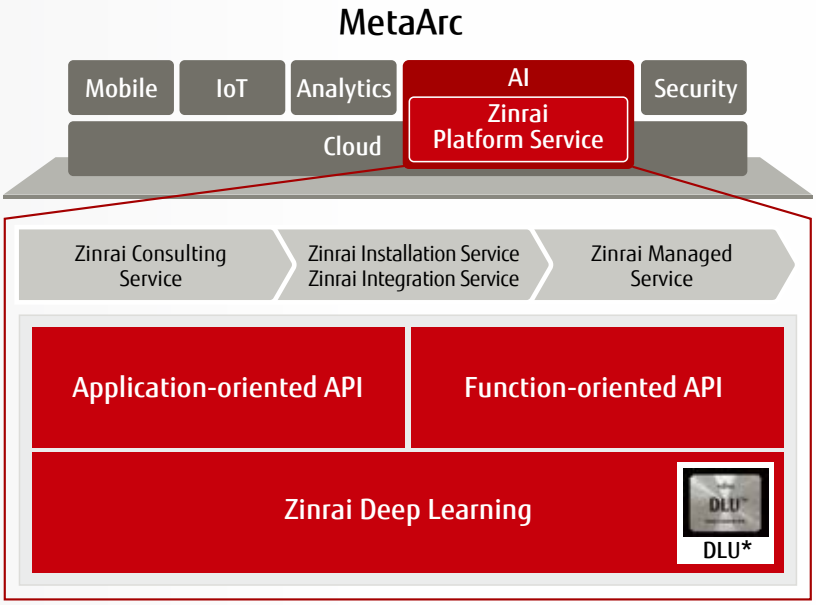
In many cases businesses face a lack of data to conduct advanced deep learning analysis. In response to this challenge, Fujitsu is developing adaptive learning technology to enable precise learning by starting with a small amount of data and incrementally adding to it. In an experiment in Itoshima City, Japan, AI succeeded in matching the preferences of people planning to move to the city with the areas available for them to choose by gradually learning their likes and dislikes.

## Initiatives for AI Implementation: Data Quality Enhancement and Accumulation of Data

Business data comes in a range of formats, with associated degradation and shortcomings. Therefore, it is vital to improve data quality through format conversion and data cleansing processes. In addition, organizations should collect large amounts of information that span various levels of granularity and different data types. This includes a company's own business data as well as external open source data. Since January 2014, Fujitsu Laboratories has provided open access to its LOD4ALL service, which gathers Linked Open Data from around the world and offers it for global research.*8 EvaCva, a service to evaluate local government agencies is provided using LOD4ALL.*9

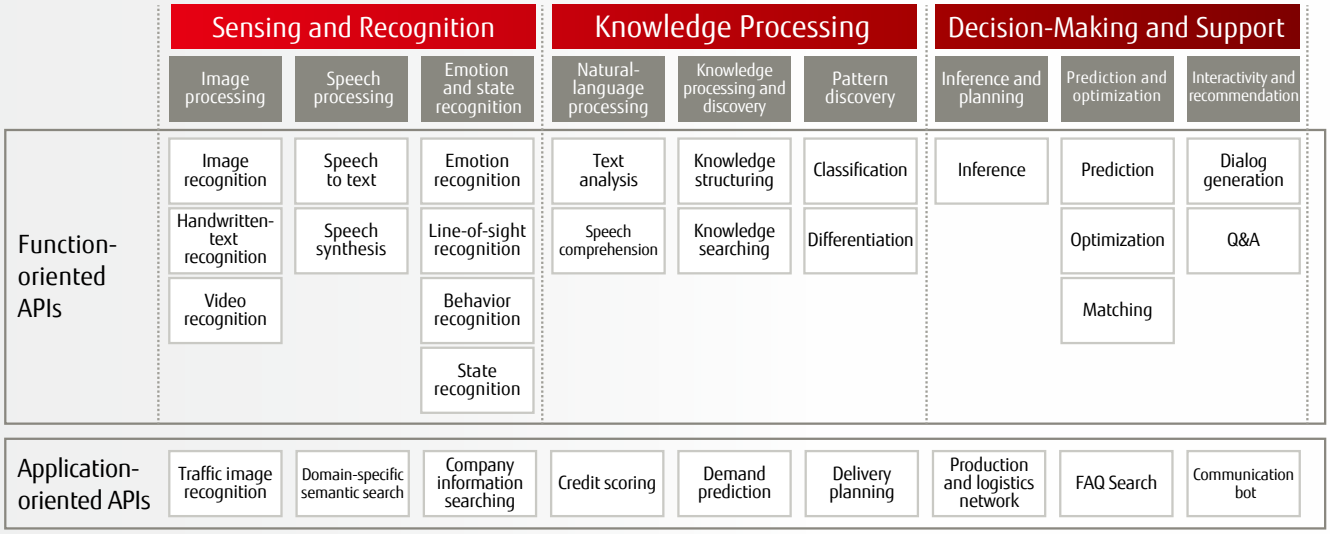
## Fujitsu's AI Zinrai Accelerates Digital Transformation

Fujitsu has developed a framework known as "Zinrai", the result of more than 30 years of AI-related research and development. Under this framework Fujitsu has conducted Proof of




*Deep Learning Unit

*7 IDC Japan, Japan Predictions 2017 "IDC FutureScape: Dawn of the DX Economy" (Jan 2017)
*8 LOD4ALL : http://lod4all.net/index.html
*9 EvaCva : http://evacva.net/en/




concept(PoC) projects, such as call center support and predicting faults in factory equipment. In April 2017, Fujitsu releases the Zinrai Platform Service under the framework of its MetaArc, which incorporates all of the industry and business expertise acquired from these PoCs as well as from the company's own in-house solution deployments.

1. Provides a total of 30 APIs, comprising Function-oriented APIs for image recognition, natural language processing and others, as well as Application-oriented APIs for immediate business use by customers, such as demand forecasting and credit scoring.
2. Zinrai Deep Learning provides the world's fastest learning capability; the application of our supercomputing technology increases transaction speed by 50 times.
3. Our adaptive learning technology enables faster development, and the function of distributing algorithms to edge devices accelerates use of AI in various businesses.

Furthermore, Fujitsu is developing a proprietary DLU™(Deep Learning Unit) processor specifically for deep learning, leveraging our processor technologies applied to the K computer*10 and advanced CMOS technology. We plan to start using it for commercial services in fiscal 2018.
Through the Zinrai Platform Service, which can be used either via the cloud or on-premise, Fujitsu provides complete support over the lifecycle of our customer's AI usage, from consulting through to deployment and operation.

## Collaboration of People and AI

Fujitsu provides RIKEN with a "Deep Learning System" dedicated to world leading AI research. This contributes to accelerating R&D using AI technology via a supercomputer system. In addition, Fujitsu and RIKEN established the "RIKEN AIP-FUJITSU Collaboration Center." The aim is to respond to social challenges by conducting a series of research projects that will extend from basic technology development through to the deployment of this technology in society. The center will research the next generation machine learning technology to follow Deep Learning, the fusion of simulation and AI, and the creation of large-scale knowledge structures.
Fujitsu is collaborating with Kyoto University on a genome information database development project being driven by the Japan Agency for Medical Research(AMED). This project is focused on healthcare-oriented big data analysis technology using Machine Learning and AI, and will develop a system which produces interpretations of clinical treatments for doctors and recommendations of appropriate medication.
Furthermore, in pursuit of AI with more human-like skills Fujitsu and Okinawa Institute of Science and Technology Graduate University began joint R&D on learning algorithms. This research uses the latest neuroscience insights and incorporates the mechanism of a human brain's learning process into the extensive learning algorithms.
As technology evolves, the balance between the appropriate regulation and the promotion of AI implementation is important for wider social acceptance of AI technology. Therefore, Fujitsu actively participates in governmental initiatives in Japan to create development guidelines for AI.
AI enables people and businesses to gain advantageous new insights from data. And AI gains new insights by receiving input and feedback from people. Collaboration between people and AI fosters the continuous creation of new value and innovation. Fujitsu will strive to develop Human Centric AI technologies that support and empower people, to realize a new level of human AI collaboration.

*10 A supercomputer developed jointly by Fujitsu and RIKEN

# Hybrid IT

## IT Infrastructure Vision and Present Situation

What will the IT infrastructure of the future look like? IT will become more software-defined, more automated, and smarter. IT operation will become simpler and more flexible, and be able to evolve independently from the top level services. Is the current IT infrastructure moving in this direction? Now cloud adoption is accelerating as organizations seek the benefits delivered by new technologies such as mobile, big data and IoT. As a result, the IT infrastructure environment has become increasingly complex; a mix of existing on-premise infrastructure and clouds, all provided by a range of vendors. Organizations must address the issue of how they achieve a balance between the many conflicting demands being placed on the IT infrastructure. For instance, ensuring that business units have the agility to act and deploy new solutions, which are increasingly cloud based, while ensuring governance and compliance are not compromised. Providing data availability 24/7, across geographies and across devices, while assuring that privacy and security will not be breached. What kind of IT infrastructure can be developed to manage the current complex IT environment, while evolving to meet the challenges of the future?

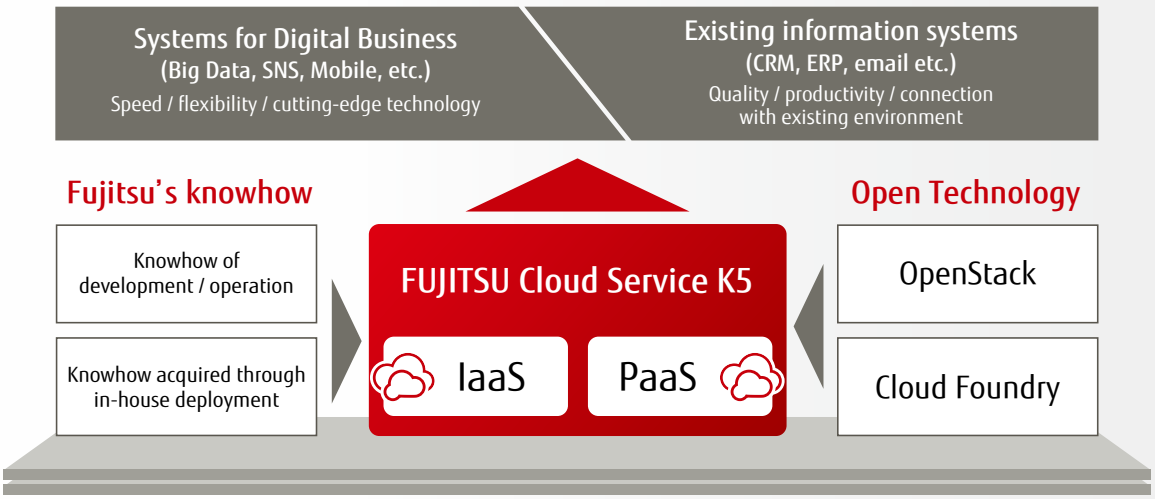
## Hybrid IT

The solution lies in Hybrid IT: a mixed technology environment architected to enable a governance framework that matches the new pace of business, and the flexibility to adapt and evolve with changing business needs. **Fujitsu defines Hybrid IT as infrastructure that enables the connection between digital and existing IT systems**. Hybrid IT provides services which fully exploit the advantages of both the digital and existing IT technologies, while maintaining overall IT security and governance. To achieve a successful Hybrid IT implementation, organizations need to not only introduce new technologies, but also manage the entire implementation process. Specifically, the following needs to be considered.

- An IT architecture that orchestrates business and technology
- Technology that connects existing IT and digital technology
- Seamless IT operation

## Architecture Orchestrating Business and IT

IT systems need to be designed and set up in a way that achieves business goals and drives digital transformation. At the same time, IT systems need to be designed to take into consideration security, data protection and compliance requirements. In Japan, Fujitsu MetaArc Grand Design Service is backed by 500 experts in security, networking, and other IT competencies. These experts fully support the overall design of optimized systems including multi-cloud and hybrid cloud systems and migration scenario. They also support actual implementation and can propose solutions for designing a fully orchestrated IT system.




## Technology and Services Enabling Hybrid IT

As a core element of Fujitsu's MetaArc, the FUJITSU Cloud Service K5 enables Hybrid IT. K5 is the world's largest OpenStack based cloud platform, and open technology allows K5 to connect easily with other clouds. To meet the varied cloud needs of customers, K5 and Fujitsu's private cloud infrastructure PRIMEFLEX apply unified architecture to offer the full range of cloud options from on-premise private cloud to public cloud. In addition to Infrastructure as a Service, K5 provides various Platform as a Service offerings. For example, the Platform Service modernizes and transforms legacy applications to more flexibly and resiliently support the migration to cloud of mission critical systems. The Application Service based on the Cloud Foundry allows customer to develop applications, which can then be published via the API Management Service. K5 is a key enabler of Connected Services. On top of K5, many services are developed and connected, enabling new value to be created. Using Fujitsu data centers and global delivery centers worldwide, K5 delivers IaaS and PaaS Services consistently across the globe.

Hybrid IT combines a range of public clouds with on-premise systems. Therefore, it is important to safely, optimally and flexibly connect the public cloud, on-premise systems and devices, via the internet and mobile networks. Networks play a very important role in achieving this. Fujitsu provides a range of network products and services, which enables the rapid establishment of the appropriate network architecture for the server virtualization environment, and that can flexibly responds to the requirements of systems development activities and modifications.

## Service Management for Hybrid IT

An increasing number of lines of business within organizations are independently negotiating cloud services contracts to enable quick adoption of IT services for their own projects. This is leading to various issues related to operations management, cost and security. Orchestrating Hybrid IT across technology, service, supplier and process is critical. Fujitsu provides multi-cloud integration management products that address these challenges. These products centrally manage cloud usage, contracts and costs, and are delivered via a portal that supports the strategic use of the cloud and strengthens IT governance and infrastructure management.

With its track record in IT system development and integration, and operational knowhow obtained through the in-house introduction of digital technologies, Fujitsu continues to support the successful implementation of Hybrid IT for customers by drawing on its IT design, technology and operation expertise.

# Security for Business Growth and Cyber Security

## A Security Management Dilemma

The cyber and real worlds are now very closely intertwined. Compromising security in the cyber world can have very tangible and damaging effects in the real world. What type of security is needed to bridge these two interlinked worlds? Using the latest security technologies to protect important customer information allows organizations to increase their business opportunities. Such use of cutting-edge security technologies for business growth has also become an important tool for increasing corporate value. At the same time, adopting security measures for protecting against cyber-attacks is vital. Previously, the focus of security was on how to protect information. However, we now need to focus more on Mission Assurance and Business Continuity, minimizing damage and restoring business to secure business continuity.

## Co-creating Business by Introducing Security Measures for Business Growth

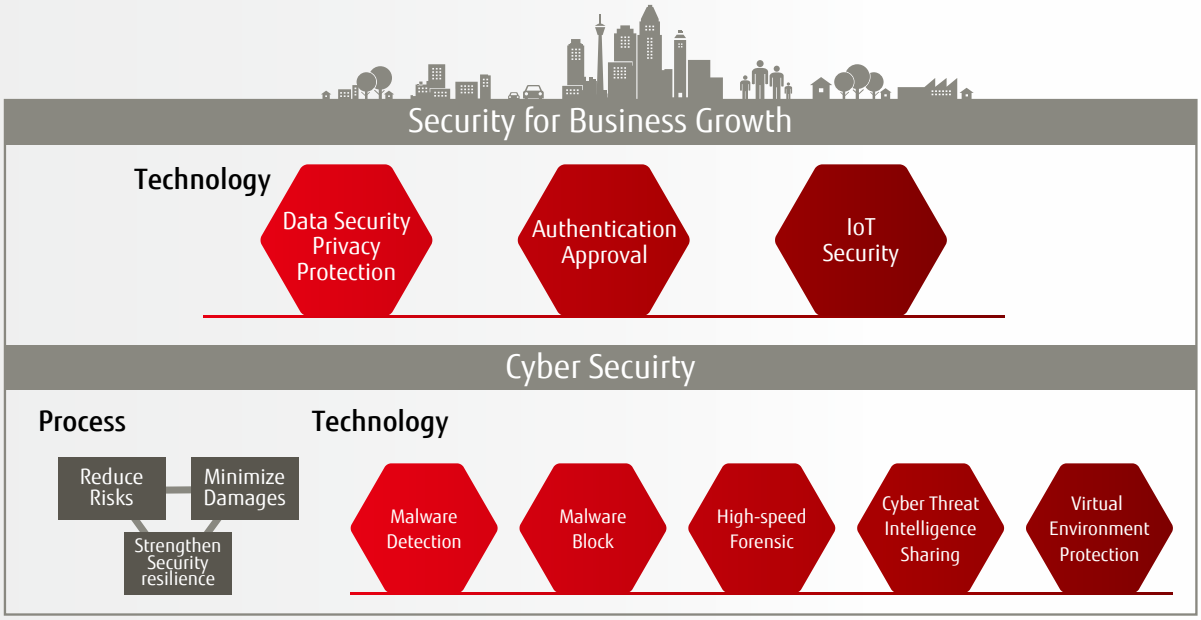
As seen in the Amended Act on the Protection of Personal Information in Japan (effective May 2017) and the EU General Data Protection Regulation (EU GDPR effective May 2018), policies and rules for data handling are becoming more strict globally. Even though this trend requires organizations to apply more stringent data protection measures than ever before, it also opens up new business opportunities by using securely protected data. Fujitsu has developed the following technologies to co-create new business with its customers.

1. Data security and privacy protection
   Anonymization and advanced encryption technologies for personal data and sensitive data, and secure blockchain technology to enable robust data linkage
2. Authentication and approval
   Biometrics and machine authentication technologies and an authentication platform for safely and conveniently connecting the cyber and real worlds
3. IoT security
   Provisioning technology for installing and managing IoT devices securely and safely, and technology for testing the robustness of an IoT system

## Cyber Security Measures for the Future

Cyber-attacks are becoming more destructive worldwide. The methods being used are also increasingly more sophisticated, making it almost impossible to stop every cyber-attack. Going forward, it must be assumed that cyber-attacks will occur and therefore proper procedures must be put in place to handle incidents, from when they are first detected through to clearing the risk. Fujitsu provides end-to-end security measures for helping customers to manage cyber-attack incidents:

1. Mitigating risks
   By monitoring the status of cyber-attacks worldwide and continuously gathering intelligence on vulnerabilities to identify incidents at an early stage
2. Minimizing damage
   By acting quickly and using appropriate measures against incidents




3. Strengthening security resilience
   By undertaking periodic assessments to identify and act on areas of improvement

Fujitsu conducts research and development in the following 5 areas to guard against more frequent and smarter cyber-attacks.

1. Malware detection technology that monitors the behavior of hackers
2. Technology for blocking malware within a company's network
3. High speed forensic technology for detecting and identifying targeted cyber-attacks in a short period of time
4. Sharing technology of cyber threat intelligence (information on malware and other attacks as well as counter measures)
5. Traffic analysis and protection technology in a virtual system

## Organization and Talent for Security Resilience

Today's organizations need to be equipped with security resilience capabilities to respond to an unexpected scenario and to be ready for a dynamically changing situation during a security breach. Security resilience firstly requires organizations to change the culture of their people and management. They should appoint a Chief Information Security Officer (CISO) to be responsible for security governance. In addition, enterprises should establish a Security Operation Center (SOC) as the focal point of security operations and a Computer Security Incident Response Team (CSIRT) dedicated to handling security incidents. Organizations must use a systematic approach for recruiting and training security engineers who have the latest cyber security knowledge and are capable of identifying and handling security threats.
Fujitsu helps organizations to implement security resilience and provides security functions such as CSIRT as a service. We also provide a training service at the 'Cyber Range', a special training facility in Japan that deploys a virtual environment. Fujitsu develops best-in-class security solutions based on our unique knowledge and experience.

## Your Co-creation Partner for Cyber Security

An increasing number of regulations for enforcing cyber security are being established around the world. Some examples include the United States' security controls NIST:SP800-171, SP800-53 and the EU's NIS Directive. Global companies are required to follow international regulations as well as the policies of each country they operate in. Fujitsu, as a co-creation partner, continually develops new security technologies and security talents in a proactive manner. Fujitsu also contributes to security policy creation that delivers robust security measures for business growth and cyber security.

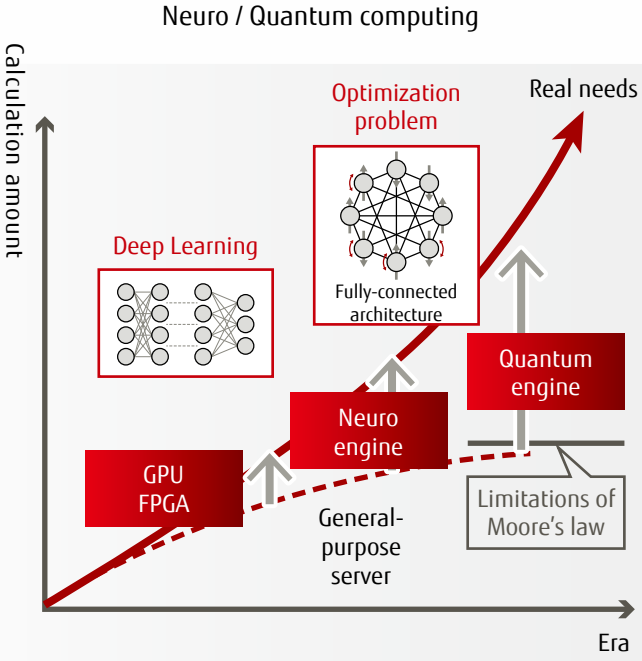
# Future Technology

## Limitations of Existing Technology

CPU performance increased 50-fold between 1995 and 2010, while the cost of networks fell to only a 1/20,000th of the figure from 15 years earlier. Together these technological innovations have made it possible to readily access business and IT services via a network. However, it is anticipated that current technologies will hit their limit in the 2020s. For example, the development speed of semiconductors under Moore's Law and the transmission capacity of a single optical fiber are now reaching their limits. In 2030, the total volume of data generated by people worldwide is predicted to exceed the yottabyte level – a trillion terabytes - and it will be impossible to manage this using current technologies. Innovative future technologies are expected to overcome this limitation.

## Co-creation of R&D

Around 1,400 researchers at Fujitsu Laboratories conduct R&D in cutting-edge technologies, partnering with world renowned universities, enterprises and research institutes. Together they focus on the R&D vision and strategic framework known as the Hyperconnected Cloud. The aim is to achieve a digital business platform of the future based on Connected Services, web-scale ICT infrastructure, core/front networks, AI, and security.




## Open Innovation in AI

The most important technology for enabling the Hyperconnected Cloud is AI, and Fujitsu has over 30 years of experience in AI research. In collaboration with the French Government, Fujitsu has started various innovation projects to support digital transformation in France. These include establishing an AI-focused Center of Excellence, conducting joint research in AI, strengthening cooperation with startups, and contributing to 'digital-ready' human resource development. Through these projects, Fujitsu is helping to accelerate innovation in both countries.

## The Future of Computing

Fujitsu has been engaged in research to realize the huge performance increase in large-scale data processing required to solve the social challenges of the future. The first key area to tackle is domain-oriented computing. Faster processing speeds are being achieved by integrating a new architecture specifically designed to handle encryption, search images and so on to a general-purpose processor. These technologies are expected to be used in sectors such as the healthcare and finance. Looking toward the intelligent computing era of the future, Fujitsu Laboratories is developing a new architecture and researching quantum computing as well as neurocomputing, to simulate the working of brain cells.

## AI and Beyond

Progress in ICT is leading to astounding advances in AI technologies. However, there are still many elements in this field that remain largely undiscovered. Investigations are under way into the very nature of AI. Fujitsu is developing self-learning AI and AI which autonomously identifies problems. In addition, Fujitsu has commenced development of AI technologies that identify and analyze senses and emotions quantitatively, seeking to interpret five human senses in order to understand people.

Fujitsu invests in the latest technologies to create a different future with advanced computing and AI. This will be a future where AI and computing can understand people, autonomously support us and solve challenges in business and society. Using digital technology, Fujitsu engages with customers and partners: Digital Co-creation toward a Human Centric Intelligent Society.

# Driving innovation by Digital Co-creation

Showing how digital co-creation creates new value.

## The Institute of Sanitary Research of the San Carlos Clinical Hospital / Hospital Clínico, Madrid

# Revolutionizing clinical decision-making using artificial intelligence

Big data analysis is expected to help doctors make more accurate clinical decisions in the healthcare sector. Innovation Unit of The Institute of Sanitary Reseach of the San Carlos Clinical Hospital (IdISSC) and Fujitsu together launched a co-creation initiative to build an advanced technology platform using artificial intelligence.

> *Taking advantage of the possibilities offered by Artificial Intelligence is essential for public health to stop managing the disease and move towards generating health.*
>
> *Germán Seara Aguilar, MD, PhD, Innovation Unit, The Institute of Sanitary Research of the San Carlos Clinical Hospital, Madrid*

### Cross analysis of data was key to innovating healthcare

The San Carlos Clinical Hospital (HCSC) has sought to improve care, teaching and research since it was founded in 1787. During over 2 centuries of history, the hospital has changed and adapted to meet the demands of the residents of Madrid and the high standard of its facilities and staff have made it a national and international leader. The HCSC Innovation Unit of The Institute of Sanitary Research of the San Carlos Clinical Hospital (IdISSC) is responsible for promoting, supporting and disseminating healthcare innovation and supporting the process of transforming ideas into products and services that represent value for patients, staff and the system as a whole.

The digital transformation has seen the advent of Big Data and the analysis of data from all sectors, including healthcare, to help organizations make better decisions. The potential of Big Data in healthcare lies in taking advantage of all the information that can be gleaned from data to improve the quality of the sector and, most importantly, improve the care provided to patients and the public.

Traditional healthcare institutions have extensive paper archives built up over many years, representing a body of data that is often difficult to systematize, locate and interpret. The implementation of the electronic clinical history represents significant progress, facilitating analysis by providing information in an accessible and legible format with centralized access.

However, in a "post-digitization" era, the information generated on a daily basis remains underused. "We have access to a vast quantity of data but it's hard to extract meaningful information that helps us improve the quality of the care we provide," explains Dr. Julio Mayol Martínez, Medical Director and Director of Innova-

tion at the San Carlos Clinical Hospital.

## Building an advanced clinical research information system using artificial intelligence together

At the end of 2014, Fujitsu approached HCSC to show some of the tools its innovation and data usage teams had been working on. "It was designed as an open format, with the chance to ask questions and analyze whether Fujitsu tools could help answer them," explains Dr. Germán Seara from the Innovation Unit. "We realized Fujitsu's proposal was different from those of other commercial companies. Fujitsu saw us as a partner in a collaborative relationship based on co-creation and innovation."

HIKARI (light in Japanese) is an artificial intelligence solution developed jointly by Fujitsu Laboratories Europe (FLE), Fujitsu Spain and the Innovation Unit at The Institute of Sanitary Research of the HCSC Madrid. This human-centric solution allows doctors to access integrated, grouped and anonymous data obtained from clinical and non-clinical sources. It is a new advanced clinical research information system that brings together an advanced suite of micro-services that allow doctors to extract knowledge and carry out analyses using multiple data sources related to patient health. The platform is the fruit of in-depth research into the application of data analytics in the healthcare sector. It implements Fujitsu Laboratories' cutting-edge data analysis and anonymity technologies, adapted to the specific needs of the Spanish healthcare sector. In the meantime, Fujitsu has developed the Human Centric AI Zinrai framework, the result of more than 30 years of AI-related research and development.

## Achieving positive results that are 85% more accurate in identifying risks

After a year of working together, at the start of 2016, the joint project was ready to begin field testing. 6 months later, the results already deduced that the time taken by doctors to carry out preliminary assessments of patient records would be halved, freeing up more time for consultations.

"The first phase of the project was much more descriptive. Using proofs of concept, we devised a set of questions we wanted to answer from a clinical/medical perspective, thus defining the information on which we would focus, seeking to understand patient behavior in their care journey," explains Dr. Germán Seara. "The information obtained from proofs of concept and the convergence of the information from different databases and different formats, such as accident and emergency, inpatient care and consultations allowed us to begin to group responses together and visualize them. HIKARI identifies care patterns, establishes demographic profiles, provides exploratory analysis of datasets and delivers information via a rich and interactive visual environment. In just seconds, HIKARI gives us an instant and complete picture, something which used to take hours. To access and order this information has completely revolutionized the clinical decision-making process."

"The ability to separate patients into categories depending on


the type of diagnosis or more general psychiatric risks allows us to attribute mental-health and general pathologies to these categories and risks. This is essential for allowing doctors to understand all the health risks associated with a patient and prescribe the most appropriate treatment," adds Dr. Germán Seara. "In the testing phase, we saw positive results of over 85% in identifying the risk of suicide and alcohol or drug abuse."

"Establishing predictive analysis models for the next step will allow us to let patients and the public play a much more active role in their own health. An informed patient must be able to make decisions on what they want to do with their life. Medical practitioners will act as consultants who provide patients with advice, but it's their life. Taking advantage of the potential of artificial intelligence is a fundamental part of ensuring the development of public healthcare beyond managing illness, moving towards a participative, predictive, preventive, personalized and population model of health," explains Dr. Germán Seara.

"The philosophy and practice Fujitsu has brought to this project is what everyone who is interested in innovation looks for. A company that is sensitive to the suggestions of its partners. Fujitsu listens to you and understands your needs and philosophy," remarks Dr. Germán Seara.

**Customer Profile**

### The Institute of Sanitary Research of the San Carlos Clinical Hospital / Hospital Clínico, Madrid

Address: Calle del Prof Martin Lagos, 28040 Madrid, Spain
Founded: 1787
Employees: 5,000
URL: www.idissc.org/en/


## Fukuoka Financial Group, Inc.
## iBank marketing Co., Ltd.

# Driving ecosystem-based businesses harnessing Fintech to attract younger customers

Fintech (financial technology) is transforming the finance sector. Observing the widespread use of Fintech in Japan, the Fukuoka Financial Group planned a new iBank financial services platform in collaboration with its debit card business. The cloud-based platform was launched in July 2016. A new smartphone app successfully attracting younger-generation customers aged under 30, as well as increasing the number of the debit cards issued.

> *Timing is really important for initiating drastic transformational initiatives. Fujitsu, which was involved in Fintech from its earliest development stage, understood our thinking. Our partnership with Fujitsu was instrumental in creating the iBank that you see today.*
>
> *Kenichi Nagayoshi, CEO*
> *iBank marketing Co., Ltd.*

### Transforming the conventional finance business model to meet a changing financial environment

Headquartered in Fukuoka City, Fukuoka Financial Group, Inc. (FFG) is a financial holding company, having The Bank of Fukuoka, The Kumamoto Bank and The Shinwa Bank in its group. The Group is one of the largest regional banks in Japan with total funds in excess of 13 trillion Japanese yen as of March 2016. It is also currently planning to integrate its business with The Eighteenth Bank, Ltd. in October 2017.

Despite of its strong position in the market, FFG is still facing external changes. Kenichi Nagayoshi, CEO of iBank marketing Co., Ltd. and Assistant General Manager of the Sales Planning Division of Fukuoka Financial Group, comments, "With a falling population, declining birthrate and aging society, the market is expected to shrink in the future." Although the business integration and increase in fee-based business are giving positive impacts to its core business, FFG is under pressure from advances in information and financial technologies, shifting attitudes of younger customers, and new trends of direct banking.

According to Kenichi Nagayoshi, FFG must implement "drastic transformational initiatives" to continue providing its customers with financial services in line with its brand slogan, *'To be your Bank of choice'*. He says the aim of the Group was to "build loyal customers for the Fukuoka Financial Group by providing services that truly attract customers and go beyond the traditional financial and brand concepts."

## Partnering with Fujitsu to build cloud infrastructure for a new business model

To achieve these goals, the company needs an ICT platform that enables younger customers to easily access from their smartphones they use at every moment. With this in mind, FFG founded iBank marketing in April 2016 to develop financial services platform called 'iBank' for launching new businesses.

The iBank platform adopted FUJITSU Cloud Service Private Hosted LCP as well as Fujitsu's network platform and security service. Kenichi Nagayoshi points out that "This private cloud service complies with technical standards defined by The Center for Financial Industry Information Systems (FISC), while enabling firewall isolation of each segment within the datacenter." He says the Group has high expectations for its operating quality, including rapid response in the event of a failure.

According to Kenichi Nagayoshi, FFG has been actively participating in the Fujitsu-initiated Financial Innovation For Japan consortium since it was established in July 2015, as a place for connecting financial institutions and Fintech companies. "A place for open innovation like this was extremely helpful for developing iBank."

## Smartphone application successfully attracting younger customers

The iBank platform was developed over a period of around one year from mid-2015. The Wallet+ account management app and mymo+ lifestyle information service were both launched in July 2016, while the Debit+ payments card was launched in October 2016 as a cash alternative.

Kenichi Nagayoshi says that the iBank platform has produced 3 main outcomes: attraction of younger customers, uptake of debit cards, and development of a partner ecosystem.

8 months after the July 2016 service launch, the Wallet+ smartphone app had recorded 80,000 downloads. "Approximately 65% of the accounts are customers aged under 30," says Kenichi Nagayoshi, highlighting the success in attracting younger customers.

With regard to another goal of increasing the use of its Debit+ debit card, the company achieved issuing 70,000 cards in the first 5 months. "Wallet+ enables users to check the balance of their debit card anytime. It also allows users to make small deposits from surplus into their special-purpose savings accounts with a single tap. These easy-to-use functions appealed to customers." explains Kenichi Nagayoshi.

Relationships with the business partners who use iBank analysis data have also deepened. "Members can specify a category and name for each account of their special-purpose savings accounts" continues Kenichi Nagayoshi. "Such accounts are set up for special purposes such as at trip to Hawaii. Tracking the savings patterns of these accounts allow partner companies to use the information to recommend their products and services at the best timing." FFG expects that its three-way local ecosystem – consisting of the bank, about 5.5 million individual customers, and around 220,000 business customers – will contribute to regional revitalization as well.


In addition to its core financial business, the Fukuoka Financial Group aims to expand into and deepen ties with other sectors, such as healthcare/insurance, childcare/education, and culture/public administration, by driving ecosystem-based businesses. Fintech and other cutting-edge ICT play an important role in enriching our lives and enhancing safety and security.

**Customer Profile**

### Fukuoka Financial Group, Inc.

Address: 1-8-3, Otemon, Chuo-ku, Fukuoka, Japan
Founded: 2007
Employees: 6,144
URL: https://www.fukuoka-fg.com/en/


## INESA (Group) Co., Ltd.

# Evolution toward a true Smart Factory has begun

To create an intelligent manufacturing system it is essential to monitor production operations as well as energy consumption. This requires the timely collection, visualization and analysis of data. Fujitsu helped INESA (Group) Co.,Ltd. to initiate the Smart Factory Project and boost their competitiveness.

> *Thanks to the expertise of Fujitsu, we have achieved significant results in smart manufacturing by applying IoT and Big Data technologies. We will continue to work closely with Fujitsu as we explore ways to remain a clear leader in a very competitive industry.*
>
> *Li Xiaojun,*
> *Deputy General Manager, INESA Display Materials Co., Ltd., an INESA Group company*

### Collecting production data and visualization were major challenges

The Instruments and Electronics (Shanghai) Associates Group (INESA) is a large-scale, stated-owned company in China that provides smart city solutions. Its subsidiary INESA Display Materials Co., Ltd. is the only color filter production company in the world with fifth-generation capability. In response to rapid changes in corporate business models and the market environment, the government of China announced its *'Made in China 2025'* strategy. The aim is to combine cutting-edge information and communications technology (ICT) with manufacturing, thereby enabling China to leapfrog ahead of its rivals by transitioning from a manufacturing giant that mass-produces items to a manufacturing powerhouse that focuses on production quality. To help achieve this goal, INESA is pioneering next-generation information technology and smart manufacturing to promote development and competitive advantage.

To successfully create a smart factory, the company must continually keep up with the rapid pace of market changes regarding production, quality, efficiency, cost control and reductions in energy consumption. This requires an intelligent system to handle data collection, storage, processing and visualization to enable fast access and analysis of information in mass production operations as well as energy monitoring.

Traditionally, data was collected through various statistical reports. However, this approach was problematic due to complex procedures, time-consuming labor-intensive processes and the inability to display a variety of information in a meaningful way. Furthermore, it was difficult to grasp the overall status of factory

production, equipment operation and maintenance activities.

"In our production environment, there are numerous data sources that provide information on processes, equipment and environmental factors, which can directly affect the quality of our final product," explains Wei Fengrong, Information Department Director, INESA Display Materials Co., Ltd., an INESA Group company. "Collecting this data is important to improve management. Therefore, to display it in a unified way on a single platform became a priority."

## Smart factory journey began by implementing an IoT platform solution

In January 2016, Fujitsu and INESA jointly established a Smart Manufacturing Demonstration Factory, which will be completed in 3 phases. In the first phase of the project, Fujitsu and INESA together collected and collated existing data. At the same time, an industrial Internet of Things (IoT) architecture was set up to enable visualization of the factory's production and operational status.

This solution combines proprietary wireless internet communications technology with traditional monitoring, detection and sensing equipment to solve the problem of real-time information lag when trying to analyze the factory's production status. To generate summary reports, utility consumption data - such as electricity, gas and water - as well as information on changes in the environment were automatically collected.

Fujitsu also designed a Big Data platform to centrally store and process all of the factory's energy consumption and production data, achieving the rapid capture and in-depth analysis of a huge amount of information.

"Based on Fujitsu's Big Data platform and wireless industrial IoT technologies, we are jointly exploring the area of intelligent equipment maintenance," adds Wei Fengrong.

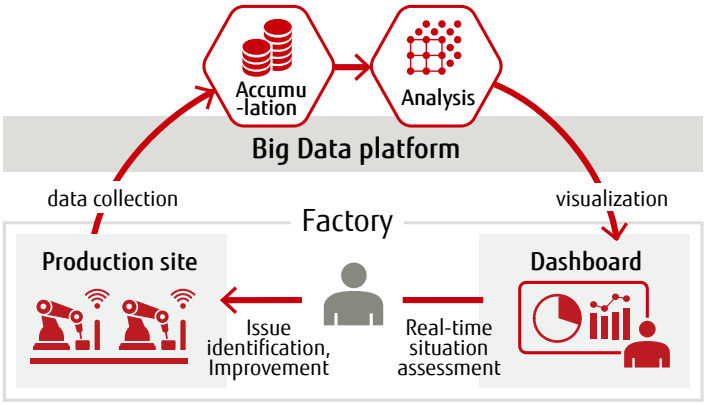
The FUJITSU Enterprise Application Intelligent Dashboard provides a single unified display of major key performance indicators, such as production performance, product quality, equipment status, factory environment and energy consumption. As a result, the dashboard enables the early detection of equipment malfunction, allowing factory managers to identify problems and make improvements in a timely manner.

## Support for operations at any factory while caring for the environment

Management efficiency has significantly improved following the implementation of the new Fujitsu solution. Analysis of operational data revealed a 25% rise in productivity and a 50% reduction in manufacturing process time. In addition, the solution refreshes energy management data every 45 seconds, which encourages employees to be proactive and help prevent faults.

Thanks to the superior performance and excellent results achieved, the INESA Smart Factory Project has been nominated for a '2016 Smart Manufacturing Pilot Demonstration Project' award, becoming one of the few factories that have exemplified the concept of Smart Manufacturing.

"The FUJITSU Enterprise Application Intelligent Dashboard monitors the status of the production site in real-time, as opposed to every 10 minutes or more," continues Wei Fengrong. "In addition, the data provides vital feedback to assist managers, including information on production management; quality and scrap rate; energy consumption; and equipment status."




"In particular, the FUJITSU Enterprise Application Intelligent Dashboard system is rapid in its response to equipment issues," says Wei Fengrong. "This process helps solve problems in a timely manner, thereby increasing productivity. Furthermore, the system also has a retroactive function, which can replay incidents that went unnoticed by managers. This feature enables us to investigate the cause of a problem and to prevent similar incidents from occurring in future."

Deputy General Manager Li Xiaojun concludes, "As a provider of Smart City integrated solutions, INESA actively responds to the national call to build and enhance our competitiveness through information technology. Thanks to the rich experience and expertise of Fujitsu in ICT and manufacturing, we have achieved significant results in smart manufacturing by applying IoT and Big Data technologies. In the future, we will continue to work closely with Fujitsu as we explore ways to remain a clear leader in a very competitive industry."

**Customer Profile**

### INESA (Group) Co., Ltd.

Address: 168 Tianlin Road, Shanghai, China
Founded: 1958
Employees: 16,000 (as of July 2016)
URL: http://www.inesa.com/eng/

## TOMOE Corporation

# Augmented Reality (AR) boosts the efficiency of assembly inspection

TOMOE Corporation is engaged in a broad range of business areas, from general construction to specialized steel towers, bridges, and steel structures. The company had relied primarily on visual inspection of its assemblies used in the construction of various structures, but defective inspections resulted in significant rework. Fujitsu then engaged with TOMOE Corporation to jointly develop an assembly inspection system that employs 3D computer-aided design (CAD) data and AR technology. Any miscalculations can now be detected at the factory, prior to assembly at the worksite, thereby improving quality and preventing delays in the on-site assembly process.

> *If we miss an error during the materials assembly stage, it leads to rework in subsequent stages and delays in the final construction schedule. Our objective was to ensure we could catch every error by harnessing the power of ICT in the inspection of assemblies.*
>
> *Hiroaki Nishihara*
> *Executive Director and Factory Manager*
> *Oyama Factory, TOMOE Corporation*

### Contributing to community advancement using proprietary construction-related technology

Since its establishment in 1917, TOMOE Corporation (TOMOE) has been involved in the design, manufacture and implementation work on a vast array of buildings, steel towers, bridges and steel structures. The company has developed numerous proprietary construction-related technologies and won widespread acclaim for the technological prowess exhibited in a wide range of projects. These include the evocative sail-like roof over the multipurpose commercial facility of Tokyo Station.

Since 2006, TOMOE has been a pioneer in promoting the use of ICT in the design process by employing 3D CAD and automated design solutions. Unfortunately, the task of checking that assemblies are produced exactly as designed on the CAD plans was largely a manual operation that relied on visual inspection and measurement tools. Human error in measuring key dimensions or angles would increase the risk of misaligned components being delivered to the construction site.

"If we miss an error during the materials assembly stage, it leads to rework in subsequent stages and delays in the final construction schedule," elaborates Hiroaki Nishihara. "We also foresaw that manual inspection would become increasingly problematic as the scale and complexity of construction projects continues to grow. Therefore, our objective was to enhance quality and ensure that we could catch every production error by harnessing the power of ICT in the inspection of assemblies."

TOMOE initially developed a proprietary technique for detecting misaligned components, which involved overlaying 3D CAD data on

photographs of assemblies. A prototype system was developed, but the interface was too complex and many staff found this tool difficult to use.

In search of a resolution, TOMOE turned to Fujitsu – a partner for more than a decade in the area of CAD/CAM system implementation and operation. Fujitsu proposed the development of an assembly inspection system based on AR technology. TOMOE's Oyama Factory was chosen as the site for a proof of concept. Takeshi Yanagihara, Director of the Systems Promotion Department in the Development Division of TOMOE, reflects, "Initially we envisaged a system that would use AR markers, but we commenced joint development following Fujitsu's recommendation to deploy markerless AR technology. This approach provided better flexibility and was more user-friendly."

## Instant inspection capability via the tablet device's camera and user-friendly interface

The proof of concept for the AR-based assembly inspection system ran from December 2015 to June 2016. The target product for this trial was one of the company's leading offerings, known as the TOMOE UNITLAS, used in a diverse array of structures. The solution comprises steel balls and steel boards that are connected at intervals of between 30 and 100 centimeters. The assembly inspection system jointly developed by TOMOE and Fujitsu uses the camera in a tablet device to take photos of the relevant components during the materials assembly process. Data for the linear elements is extracted from those photos and overlaid on solid model images drawn from the 3D CAD data, allowing for immediate inspection on the tablet screen. "During the proof of concept we continually refined the system to more effectively detect simple linear images from the photos of materials combined in complex shapes," explains Takeshi Yanagihara.

## Accurate error detection eliminates rework in later stages; system rollout to all factories being planned

Some of the key benefits of the assembly inspection system confirmed during the proof of concept included ease of use for all participants and a drastic reduction in inspection time. "The inspection of one component now takes only 2 to 3 minutes, which is about 10% of the time required for visual inspection – significantly boosting our productivity," comments Akihiro Domeki, Team Leader of the No. 2 Manufacturing Group in the Manufacturing Department at the Oyama Factory of TOMOE, highlighting the compelling trial outcomes. "It is so easy to operate that even novices can pick it up very quickly. We currently have 3 staff at the Oyama Factory using this system, but plan to add 2 more so that we will have a team of 5 undertaking this inspection work."

As a result of implementing the AR-based assembly inspection system, production miscalculations and human errors that were very difficult to discern using visual inspection are no longer an issue. All faults are now accurately identified allowing early modifications during the materials assembly stage and completely eliminating rework in later stages. Kazuo Matsumoto, Director of

the Quality Management Department at the Oyama Factory of TOMOE, notes, "We achieved our objectives of improving quality and avoiding the risk of causing delays in on-site assembly schedules. Furthermore, we have earned the trust and praise of facility owners and the prime contractors who place their orders with us."

After completing the proof of concept, quality was further enhanced by adding a pre-shipment product inspection stage made possible through the combined efforts of TOMOE and Fujitsu. The assembly inspection system can now also be used to inspect large steel structures, which was previously not feasible, due to improvements in image processing capabilities.

The current scope will be expanded from the TOMOE UNITLAS product line to inspection of a wider range of assemblies, to boost the manufacturing quality of structures with unique shapes that would otherwise be difficult to inspect. TOMOE now plans to roll out the assembly inspection system to the Sapporo Factory in Hokkaido and the Towada Factory in Aomori to enhance the precision of materials inspection in all of its factories.

Fujitsu will further strengthen its commitment to co-creation by continuing to support the operations of TOMOE, as the company pursues its activities that contribute to many facets of society.

**Customer Profile**

### TOMOE Corporation

Address: 4-16-13 Tsukishima, Chuo-ku, Tokyo, Japan
Founded: 1917
Employees: 368
URL: http://www.tomoe-corporation.co.jp/ (Japanese-language website only)

## Australia Post

# Australia Post and Fujitsu collaborate to deliver a range of IT services

Australia Post needed to expand its digital capabilities to support a large and growing business. Fujitsu was selected as a partner to increase its service offerings by embedding digital technologies. The collaborative journey is continuing to realize more customer-friendly services.

> *Throughout its history, Australia Post has helped customers, businesses and government navigate the social changes that have shaped and transformed the country.*
>
> *Claire Bourke,*
> *General Manager Technology, Australia Post*

### Customer behavioral changes were the cue for digital transformation

Australia Post delivers over 4 billion mail items every year across 11.6 million locations, while also servicing almost 250 million visitors via its 4,000 retail outlets and processing 182 million digital transactions annually. The company has an extended workforce of 54,000 people, generating 6.5 billion AUD in revenue. IT is crucial to supporting such a large business and is becoming even more important as the enabler for Australia Post to achieve its vision of becoming a leading eCommerce provider.

Australia Post is one of the most trusted brands in Australia, with an extended workforce of 54,000 people across its integrated delivery, logistics, retail and eCommerce network. Its purpose is to help its people, customers and communities deliver a better future. Its strategy is informed by, and focused on, services that meet customers' contemporary needs. Australia Post has worked with Fujitsu to evolve and meet these changing customer needs.

"Throughout its history, Australia Post has helped customers, businesses and government navigate the social changes that have shaped and transformed the country," explains Claire Bourke, General Manager Technology, Chief Customer Office & Trusted eCommerce Services, Australia Post. "Today, Australians are embracing the digital revolution and Australia Post is continuing this tradition of responding to new expectations by helping people and businesses get online to shop, pay and deliver - whenever and wherever they choose."

Australia Post provides the Australian people and the international community with letters, parcels, logistics, eCommerce, identity and financial services. In addition, Australia Post is required by law to meet certain community service obligations to ensure that the people of Australia, no matter where they may

reside within 16 million km², have access to reliable, safe and secure postal services.

"We had to make a fundamental change in the way we service our customers because customers have changed their behaviors. We have had to focus on building out our digital capabilities to complement our physical presence," adds Claire Bourke. "As part of this transformation we had to look at our technology foundation and build out new capabilities to support the digitization of post."

## Collaborating with Fujitsu to deliver user-friendly services

Today, Fujitsu provides a full range of IT services to Australia Post, including application management; data center; end-user computing; product supply; and projects. Application management involves the design, building and testing of new applications as well as incident resolution and support for over 80 applications, many requiring 24/7 availability. "Our relationship with Fujitsu is critical to enabling our 4,000-store retail network in terms of the application support and maintenance of those applications," comments David Crombie, General Manager, Corporate Technology, Australia Post. "It's absolutely fundamental to being able to serve our customers."

Furthermore, two external data centers, one supplied by Fujitsu with Uptime Institute and leading sustainability ratings and having been in uninterrupted operation for over 2 years, enables Australia Post to operate as a leading round-the-clock eCommerce provider.

It is also important that employees have access to modern, current and flexible tools to enable them to meet the needs of their customers, suppliers and partners in the most effective manner. Fujitsu was selected as End User Computing partner in 2015. This covers all Australia Post users and includes over 12,000 PCs, laptops, tablets, 800 biometric identity systems, 4,800 printers and 8,400 POS systems. The services range from onsite break/fix to asset lifecycle management.

"Fujitsu has helped Australia Post transform to operate in the digital world. The IT support encompasses everything from end-user services to supplying POS devices," continues David Crombie. "This collaborative, reliable and flexible partnership enables Australia Post to provide an improved and rewarding experience and make life easier for customers, businesses and government."

## Collaboration continues to evolve the business

Australia Post has benefited from the global reach and expertise of Fujitsu, enabling it to provide customer-ready, fit-for-purpose technology solutions, such as data warehouse, servers, PCs and printers, supplied and implemented to be immediately effective. This product supply role also includes disposal, conforming to the strictest environmental and security requirements. In the past 12 months alone, Fujitsu has processed almost 10,000kg of Australia Post e-waste of which almost 98% has been repurposed.

"One of the key benefits of working with Fujitsu is the global reach and getting access to expertise, IP and particularly case studies from other similar organizations and how they have solved problems," remarks Claire Bourke. "We're both trying to bring ideas


to help each other in terms of the way we do business."

Fujitsu is also piloting a digital media service to provide a state-of-the-art 'endless aisle' shopping experience. "Looking to the future, we must continue to look for partners with that global expertise that they can bring to the table which will help us to continue to evolve our business," concludes Claire Bourke. "We've moved from solving a burning platform to a burning desire to continue this journey and really make a difference to our customers."

**Customer Profile**

### Australia Post

Address: 111 Bourke St, Melbourne, Victoria, Australia
Founded: 1809
Employees: Over 36,000 (extended workforce of 54,000 people)
URL: https://auspost.com.au/

## Optex Co., Ltd.

# IoT Platform enables rapid development of new services and business model transformation

Optex is known globally for its far-infrared sensors used in automatic doors and its extensive range of measuring devices. In addition to manufacturing and selling hardware, it has developed a new business model for meeting customer needs. By adopting the FUJITSU Cloud Service K5 IoT Platform, Optex quickly and cost-effectively developed 'WATER it', a quick water quality analysis service. This service is already in use in Asia where it is playing an important role in overcoming environmental challenges.

> *Using the IoT platform for intelligent processing of massive amounts of data is an essential factor in the continuous growth of our business. The FUJITSU Cloud Service K5 IoT Platform was a convincing choice in terms of both efficiency and cost.*
>
> *Akihiko Nakamura*
> *Director, Development Center,*
> *Strategy Unit Optex Co., Ltd.*

### New business model shifts the company from 'a manufacturer' to 'a service provider'

Headquartered in Japan, Optex Co., Ltd. (Optex) has a worldwide reputation for designing, manufacturing and selling a range of reliable sensors. One of its core areas of expertise is in infrared sensors for automatic and security doors. Since it was founded in 1979, Optex has always maintained a presence in overseas markets, with approximately 60% of sales in 2016 coming from Europe, the United States and Asia (excluding Japan).

In 2015, the company began promoting its unique concept known as the Internet of Sensing Solution (IoS). Optex can extract valuable information, it calls 'smart data', through mining its vast stores of sensor-based data. The company aims to expand business by providing high-value-added services leveraging such smart data via the Internet.

As an extension of the IoS concept, Optex has developed a new business model to meet customer needs, beyond simply manufacturing and selling hardware. According to Akihiko Nakamura, Director, Development Center, Strategy Unit at Optex, "To secure sufficient growth of our business, we cannot rely solely on our conventional business model."

Asia is a region where environmental problems are emerging in the wake of rapid industrialization. To improve water quality in the region, tests must be carried out in various locations in frequent intervals, and the results must be quickly collected and analyzed. However, this process takes costs and time because a large number of samples need to be shipped. It is also costly to transmit data over telephone lines.

To overcome these challenges, Optex developed a method that

uses smartphones to collect measurement data from testing equipment and upload it directly to the cloud.

## Using the K5 Cloud IoT Platform to develop management services with a low startup cost

Optex originally wanted to store and analyze measurement data from the water testing devices in its own data center. However, this type of system would be extremely expensive and slow to build. Nevertheless, Optex initiated the project and searched for a solution that would allow a system to be easily built, the results to be quickly reviewed, and the project to be agilely withdrawn if the outcomes were not as expected.

To satisfy the above criteria, the company decided to implement the FUJITSU Cloud Service K5 IoT Platform, which provides functionality for harnessing the Internet of Things (IoT) on the public cloud.

Akihiko Nakamura states, "The reasons we chose the FUJITSU Cloud Service K5 IoT Platform from several options was that it enabled us to dramatically reduce startup costs, development lead-times and running costs." He also added other factors including Fujitsu's proactive mindset toward new challenges, its thorough quality management systems and its flexible support.

The FUJITSU Cloud Service K5 IoT Platform was also appealing because it enables anyone to easily develop applications. The field trial started in late 2015. Optex's device development engineers used the IoT platform's application development framework, and created a water quality management application in just 3 months. Akihiko Nakamura had a high praise for the IoT platform. "It was a great achievement in this field trial that our engineers with no special programming expertise were able to agilely develop applications. Prior to this, most of our development projects were outsourced. It was a marked change that Fujitsu's platform enabled our in-house development."

## 'WATER it' water quality analysis service developed and launched for the Asian region

Optex named this quick water quality analysis service developed through this process as 'WATER it', and launched it in the Asia region in April 2016.

'WATER it' comprises Optex's mobile water testing sensors that are used to test water quality and send the collected data to the cloud via a smartphone, as well as a cloud service for analyzing and visualizing the results. Technicians in the field, and water quality managers located elsewhere, can view the same results via a smartphone, tablet device or personal computer.

The FUJITSU Cloud Service K5 IoT Platform enabled Optex to develop its 'WATER it' service and quickly establish a new business model. Users of the service can perform inexpensive water quality testing across multiple locations fast and in real time. Users are also able to monitor changes over time by storing the data in the cloud.

Armed with nothing more than an Optex mobile water testing sensor and a smartphone, anyone can easily measure and manage water quality data anywhere and anytime. Regular testing of water

quality also improves the accuracy of results. This fosters a virtuous circle that helps the creation of action plans for improving water quality.

"Creating a virtuous circle like this enables us to achieve continuous business development and to make a contribution to society," concludes Akihiko Nakamura. "It is important for us to establish this kind of business model." Having achieved positive outcomes in the area of water quality testing, "Optex is now working to develop a new service in a different area."

**Customer Profile**

**Optex Co., Ltd.** (OPTEX GROUP Company, Limited)

Address: 5-8-12, Ogoto, Otsu, Shiga, Japan
Founded: 1979
Employees: 1,640 (consolidated Group employees as of December 2016)
URL: http://www.optex.net/jp/en/

## HomeServe USA

# New organizational culture and business model created by implementing digital technology

HomeServe USA's IT infrastructure was lagging behind its rapid business growth, leaving its business processes reliant on inefficient and time consuming transaction processing. Connecting people and systems with FUJITSU RunMyProcess technology led to business transformation and changes in the organizational culture.

> *People and systems are connected, information is available in real-time and everyone knows exactly where their input is required, leaving them free to focus on more valuable activities.*
>
> *Helen Boyian, Product Operations Director, HomeServe USA*

### Digital technology proved indispensable in entering new markets

HomeServe USA's mission is to free its customers from the worry and inconvenience of home emergency repairs. Since 2003, it has been providing affordable home emergency service plans that offer protection from the high cost of repair bills and provide help for emergency repairs, all with just one phone call. The company serves over 2 million homeowners in the US and Canada and dedicates itself to being a customer-focused company providing best-in-class emergency repair plans to consumers, both directly and via leading municipal utility partners.

HomeServe USA (HomeServe) prides itself on its entrepreneurial zeal. It has seen 20% year on year growth over a 5 year period, but this rapid growth presented challenges. Technology investment lagged behind business expansion and many key processes relied on manual intervention. This created a barrier to scale, causing increasing inefficiency and ultimately threatening its ability to sustain its impressive growth.

"We wanted to use digital technology to create a more accurate, efficient and scalable business that could sustainably absorb market growth – without losing speed and entrepreneurial spirit," explains Helen Boyian, Product Operations Director, HomeServe USA. "It was important to start with a concrete external outcome that made a real difference to the scalability and security of the business while at the same time allowing the business to focus on its primary goal of delivering high quality consumer services."

Launching new or customized products to enter new markets or support partner requests is a key enabler to growth within the HomeServe business, with delays forming a hurdle to innovation. But HomeServe also operates in a complex regulatory environ-

ment, where different states apply different regulations depending on whether their services are viewed as warranty services or insurance products. Compliance failures can result in more than customer dissatisfaction; failure to comply with published terms and conditions can result in significant regulatory risk.

"Ensuring the timely and accurate introduction of new, updated or customized products – including proper state filing and organizational readiness to deliver the right T&Cs - is a critical strategic need," adds Helen Boyian. "Existing manual processes were becoming stretched to the limit, with a lack of cross functional visibility and control putting the business at risk and delaying growth."

## Digitally connecting people and systems enables transformation

To begin its digital transformation journey, HomeServe looked for a rapid digital business platform which could span and connect all of the existing functional silos and systems, enabling people to work together more effectively. "Delivering such a complex program required an environment in which we could rapidly build, test and evolve processes, roles and connections – helping us iterate rapidly to learn what made value flow best from end-to-end," continues Helen Boyian.

HomeServe selected the RunMyProcess platform and began working with Fujitsu to create a new digital application to support the critical product introduction process.

HomeServe started by mapping its end-to-end processes and worked with Fujitsu to digitally transform, automate and connect them. This was a complex cultural transformation which required change across people, processes and technologies – effectively realigning processes to optimize the delivery of outcomes.

"Digitizing your business changes it," says Helen Boyian. "You need to deliver quickly to improve your understanding and unearth new requirements. We were looking to minimize risks, and optimize efficiency, and so each iteration provided an opportunity to look again from a new perspective. Incorporating learnings quickly was much more important than getting it right the first time."

Together HomeServe and Fujitsu used the RunMyProcess platform to digitize the product introduction process from end to end. The resulting application consisted of an overarching process flow, 7 major sub-processes and 21 cross-functional teams – all connected by RunMyProcess to deliver a better outcome.

## Succeeding in the business arena while driving changes in organizational culture

The digitization and automation provided by RunMyProcess have eliminated almost all of the risk for errors, ensuring that appropriate business rules have been met before next steps are taken. This has significantly reduced the company's overall risk exposure.

Individual sub-processes now run in parallel to support the coordination of the main product introduction flow – helping to accelerate time to market by parallelizing work without losing the collaboration and control necessary to achieve accurate results.

"We have achieved a real-time view of the status of every product

via comprehensive reports, improving visibility and removing the need for complex manual collaboration and consistency checks between teams and process stages," says Helen Boyian. "This has helped to change the culture of the organization, taking care of details and enabling people to manage by exception. People and systems are connected, information is available in real-time and everyone knows exactly where their input is required, leaving them free to focus on more valuable activities rather than update manual spreadsheets and send information via email."

By effectively digitizing this critical process, HomeServe has been able to increase the speed, accuracy and scalability of its product introductions – unblocking a major barrier to accelerated growth while simultaneously reducing the risk of errors that have the potential to inadvertently violate operating licenses in different states.

**Customer Profile**

### HomeServe USA

Address: 601 Merritt 7, Norwalk, CT, United States of America
Founded: 2003
Employees: Over 800
URL: http://www.homeserveusa.com


## METAWATER Co., Ltd.

# Delivering new value with the latest cloud as a water business platform

As a key player in the delivery of water and sewerage infrastructure, METAWATER developed the Water Business Cloud (WBC) as its core solution – backed by the latest information and communications technologies – to overcome the challenges facing water supply utilities. To improve its business model and enable external sales of analysis data and collaborations with other industries, in 2011 METAWATER migrated its cloud-based Smart Field Service maintenance and inspection offering to FUJITSU Cloud Service K5. With access to a diverse range of cloud services, this move was aimed at further developing the WBC.

> *FUJITSU Cloud Service K5 allowed us to analyze the IoT data and other measurement data we had collected and provide that information to customers in the form of solutions.*
>
> *Takashi Ueno*
> *General Manager, WBC Center*
> *Business Strategy Division*
> *METAWATER Co., Ltd.*

### Offering Water Business Cloud as an open shared platform for water-related businesses

Water is the most important requirement for sustaining life, and it is the responsibility of local government water and sewerage utilities to support that crucial infrastructure. However, those businesses are facing numerous challenges, including reduced demand triggered by declining population and birthrate, aging facilities, and the retirement of experienced senior engineers.

METAWATER Co., Ltd. (METAWATER) is committed to overcoming these challenges with the most advanced information and communications technologies. In addition to designing, manufacturing and assembling water purification plants and other facilities, METAWATER is also involved in the maintenance of water and sewerage infrastructure. After formulating its WBC concept, the company has continually worked to establish it as a shared platform for a range of stakeholders in water-related businesses.

As its first step toward this goal, in 2011, METAWATER began using Fujitsu's public cloud service FUJITSU Cloud IaaS Trusted Public S5. The company was able to transform the maintenance and inspection business through its cloud-based Smart Field Service – a system that combined tablet devices with Fujitsu's augmented reality technologies. This service enabled more efficient operations while providing a means of transferring valuable maintenance knowledge from experienced senior engineers, know-how that would otherwise vanish.

Takashi Ueno, WBC Center General Manager, Business Strategy Division at METAWATER, says, "We felt that if the WBC could provide valuable information for sharing between local government entities and a range of other sectors affiliated with the water industry,

it would encourage private finance initiatives (PFIs), public private partnerships (PPPs) and other worthwhile initiatives for water-related businesses." METAWATER planned to improve its range of services through analysis of data collected through the WBC.

## METAWATER selects the K5 cloud to boost data analysis functionality via superior connectivity to external services

It was at this time, in 2015, that Fujitsu announced FUJITSU Cloud Service K5, a new cloud offering based on FUJITSU Digital Business Platform MetaArc.

"We were particularly impressed by K5's architecture, which had a strong focus on external connectivity. We felt this would allow us to use external technical services instead of developing new functions, such as data analysis," reflects Takao Uratani, Manager of WBC Management Group, Information Technology Planning Department, Corporate Strategy Planning Division at METAWATER. Quickly acquiring the relevant technical information from Fujitsu, they began researching how to use K5 to resolve the company's challenges.

As a result, the company learned that employing the IoT Platform to gather and use data would allow them to collect measurement data in real-time from devices in water purification plants and other facilities. That data could then be processed through the big data analysis and artificial intelligence functions, with the results seamlessly fed back to the management systems of water-related business operators.

Based on this research, METAWATER determined to migrate to the K5 cloud about 100 virtual servers and dozens of pieces of digital content, already being also used for its Smart Field Service, with phased migration beginning in November 2016.

During this process, METAWATER relied heavily on Fujitsu's engineers and its migration support service. "In addition to considering the best procedure for trouble-free migration of our services, Fujitsu also offered a range of suggestions for optimizing our system settings as well as integrating and efficiently configuring multiple servers," comments Takao Uratani. K5 operation is being gradually implemented as servers are migrated, with full operation planned from the end of September 2017 when the migration is scheduled to be completed.

## Accelerating the pace of solution deployment for water-related businesses and opening pathways for information-based, cross-industry collaborations

By migrating its Smart Field Service technology platform to the K5 cloud, METAWATER has improved the value of its WBC as a shared platform for water-related businesses. At the same time, it has created new routes to PFIs and PPPs initiatives in collaboration with other industries.

Takashi Ueno comments on management outcomes delivered by the migration, "We can now minimize cost increases when boosting server numbers for IoT support and data analysis." Takao Uratani elaborates, "Using existing services has enabled us to drastically reduce man-hours spent on developing applications. It

now takes us less than half the time, which directly translates to faster delivery of solutions to meet the requirements of our customers."

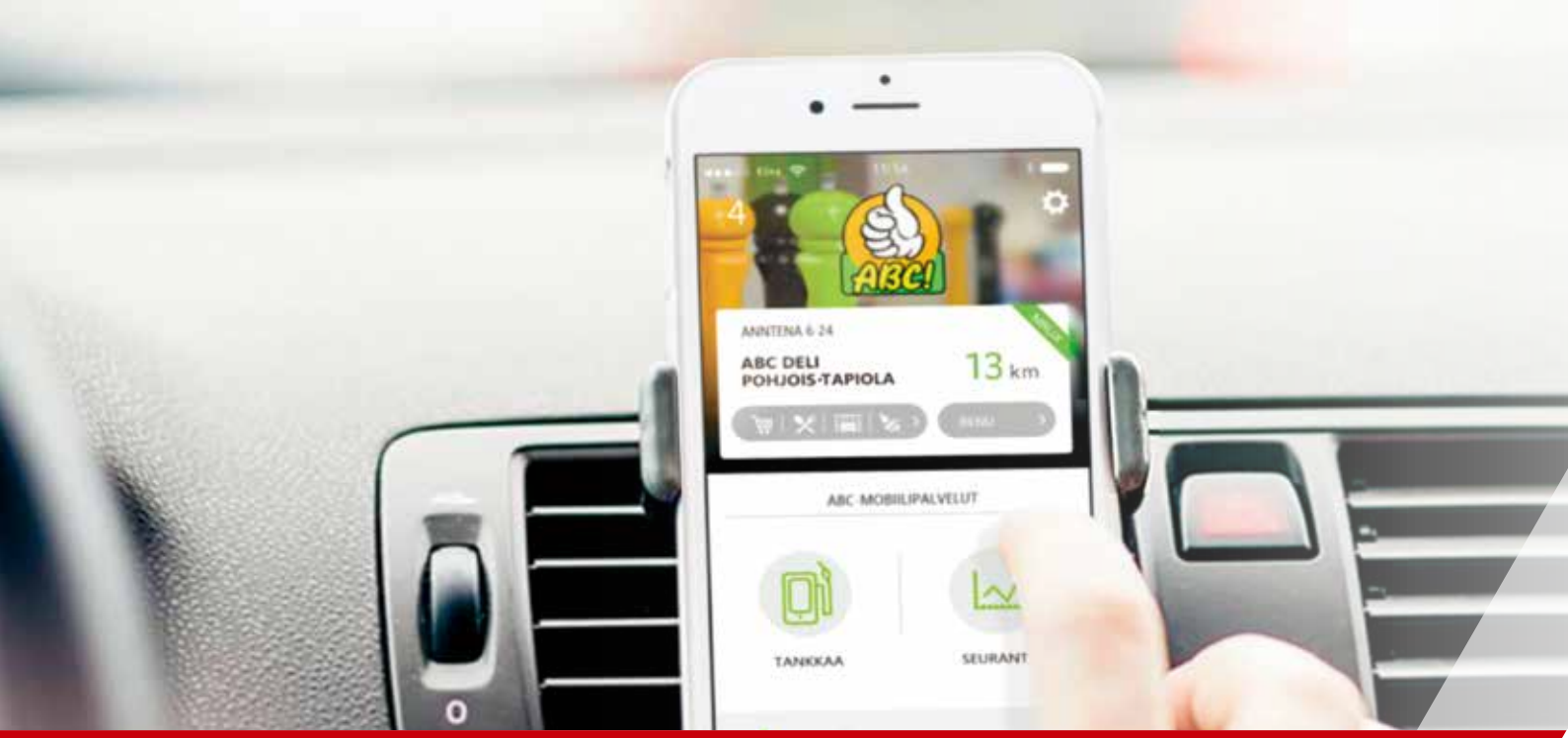
API management functionality provided as part of the K5 cloud service also facilitates the addition of data analysis functions, provided by external technical firms, into the company's Smart Field Service. "One possible business avenue is to collect IoT data and measurement data, including water levels and volumes, from a range of water supply equipment to analyze and determine any impact that outflows from water treatment plants might have on ecological systems," suggests Takashi Ueno. "The results of that analysis could be provided to the aquaculture industry."

In line with the belief that "information belongs to everyone," espoused by Takashi Ueno, METAWATER is aiming to raise the operations of water-related businesses to a new level through an ecosystem comprising a range of stakeholders from both inside and outside the industry. The company also plans to make even more extensive use of the K5 cloud in the future.

**Customer Profile**

### METAWATER Co., Ltd.

Address: 1-25, Kanda-sudacho, Chiyoda-ku, Tokyo, Japan
Founded: 2008
Employees: 2,839 (consolidated Group employees as of March 2016)
URL: http://www.metawater.co.jp/eng/




## S Group / ABC Petrol

# Co-creation of an innovative payment application that connects with existing software

ABC Petrol, a subsidiary of S Group, was keen to develop a new payment platform to improve its customer service. To build the platform, Fujitsu integrated the existing software with a new application to realize an innovative solution – mobile payment for fuel.

> *The Fujitsu-supported platform gives us knowledge about purchasing habits, which means we can give our customers the best deal. It also helps drive loyalty and incentivize them to seek out an ABC forecourt.*
>
> *Antti Erikivi*
> *Development Director, ABC Petrol*

### Integrating new and existing IT assets was key to building the new platform

S Group is a Finnish network of companies operating in the retail and service sectors. It has more than 1,600 outlets in Finland and consists of regional cooperatives. One of these subsidiaries is ABC Petrol (ABC), which provides fuel and retail outlets in over 400 locations around Finland. Another is S-Bank, which leads the financial field with a range of innovative solutions.

ABC is a relative newcomer to the highly competitive fuel sector, having opened its first service station in 1998. As such, the company has always considered itself as a disruptive innovator, introducing new concepts such as neighborhood grocery facilities and restaurants. Its approach is convenience for the customer, therefore ABC is always looking for new ways to make their lives simpler.

"It is in our DNA to challenge convention and bring something new to an old-fashioned market," explains Antti Erikivi, Development Director, ABC Petrol. "More established competitors have always focused on the vehicle but instead we built our services around human needs. Convenience is central to everything we do."

In an effort to simplify the customers' journey, ABC wanted to introduce a new payment platform, using a mobile application to select a pump and automatically transfer funds. Sister company S-Bank already had a robust S-Mobile application; the challenge was to modify this and integrate with the existing Fujitsu POS hardware and retail software.

### New platform enables building of a new mobile application for fuel purchases

This new digital service integrates the ABC mobile application with Fujitsu Retail Enterprise software and Fujitsu Forecourt Con-

troller software. When customers drive up to the station, the app shows the available pumps, customers then select the number they want to use, step out to fuel the vehicle, put the pump back and are free to drive away.

The app can only be used when the vehicle is on the forecourt, in order to discourage using a mobile phone while driving. This requires precise GPS measurements which are incorporated into the software as part of the roll-out.

Fujitsu software provides real-time information on each fueling session from start to finish. The electronic receipt is sent to the user's mobile application once the transaction is complete and payment automatically charged.

"So far, we have made this service available in over 200 locations and expect to have rolled it out to all 400-plus outlets nationwide in the next 3 months," continues Antti Erikivi. "The software upgrade can be performed remotely by Fujitsu so it is a seamless process."

## Succeeding with a positive impact on society at large and on specific business goals, with plans for further innovation

Over 600,000 customers have downloaded the ABC mobile application and transactions have increased five-fold in the 8 months since initial deployment. As always, the convenience for customers is the primary benefit, helping the company win the European Technology Implementation Award at the NACS Convenience Summit.

"Our clientele loves it and the feedback has been fantastic. Within the next year, we anticipate at least 10% of fuel sales will be generated via the app," comments Antti Erikivi. "It also helps drive loyalty; usually if people need to refuel, they'll stop at the nearest station but this app incentivizes them to seek out an ABC forecourt."

"With our service, customers no longer need to use traditional card readers and PIN codes at the petrol station. In the Finnish winter, where temperatures can dip below -30 degrees Celsius, traditional pump activation is a hassle. We believe that the app can overcome such inconveniences and ensure a seamless customer experience with automatic payments for the user," concludes Pekka Ylihurula, Managing Director of S-Bank.

With this successful project gaining pace, ABC Petrol is looking to extend its functionality to other areas of the business. For example, connecting it to its extensive restaurant estate so that customers can order food on the road, pay via mobile and then pick it up at the specified time. The company also intends to add a fuel consumption indicator so it will be easy to track usage and cost.

"There are so many ways in which we can extend this app, from monitoring fuel consumption to checking insurance coverage and roadworthy status," remarks Antti Erikivi. "We can also link to our S-Business Card and enable people to track expenses when using their car on business."

One final benefit is the ability to use the data gathered to market more effectively to its customer base. Promotional cross-selling to app users may well encourage them to place a food order or take advantage of special offers in the car wash facility or grocery.


"This innovative Fujitsu supported platform gives us a lot of knowledge about purchasing habits, which means we can give our customers the best deal while encouraging repeat visits," says Antti Erikivi. "It's been a great service from Fujitsu, as it always has been in our long relationship. We look forward to continuing the journey together."

**Customer Profile**

### S Group

Address: Fleminginkatu 34, Helsinki, Finland
Founded: 1904
Employees: Over 37,000 (as of the end of 2016)
URL: https://www.s-kanava.fi/web/s/en/s-ryhma-lyhyesti

## Qol Co., Ltd

# Deploying a health information management platform to be a supportive family pharmacy

In Japan, prescribing and dispensing drugs are separate functions, therefore medication prescribed in a hospital or medical clinic must be dispensed by an external pharmacy. Dispensing pharmacies must also start to fulfill the role of a "health support pharmacy" to improve dispensing operations as well as self-medication practices. QOL, a leading pharmacy chain, is employing Fujitsu cloud services to underpin its drive to become a health support pharmacy. QOL is differentiating itself through this pioneering initiative, which is enabling it to both support the health of community residents and enhance pharmacy management.

> *Collecting data enables us to drill deep to identify results and trends. By managing overall health information for individuals, we are able to provide more accurate health advice and instructions on taking medication.*
>
> *Shoji Okamura*
> *Senior Executive Director and Pharmacist*
> *Qol Co., Ltd.*

### Committed to the provision of total health support from the outset

In October 2015, the Ministry of Health, Labour and Welfare formulated its 'Vision for a Pharmacy', which calls for all pharmacies to operate as family pharmacies by 2025. In addition to enhancing the role of family pharmacies in the community, the vision seeks to enhance and enrich the health support functions of pharmacies to maintain and improve the health of community residents.

Qol Co., Ltd. (Qol) is aiming to meet community requirements as quickly as possible. In June 2016, Qol relaunched its QOL Support QOL Pharmacy Keio Hachioji Store as a showcase health support pharmacy, actively supporting the health needs of community residents while also performing its core role as a family pharmacy.

Senior executive director Shoji Okamura comments, "Since our company was founded, we have always aimed to support the overall health of our customers. Our QOL Card was launched in August 2010 and enables us to upload prescription data, including prescription histories and customer allergies, from all stores each day and share it via our online system."

With the consent of members, information gathered through the QOL Card can be referenced by other QOL's stores. This means that QOL Card members do not need to complete a new customer form when visiting another store for the first time. Waiting times are thereby reduced and pharmacies can readily check customer information and prescription histories. There are currently more than 2 million card holders.

Shoji Okamura adds, "According to our research, 5% of customers visit 2 or more stores each month, which made it very important to manage information through an online system. A new data man-

agement platform was therefore required to enable us to manage customer health information more comprehensively both as a family pharmacy and as a health support pharmacy."

## Health information management platform enables linkage to the medical records system

One important difference between traditional pharmacies and health support pharmacies is the contribution that the latter makes toward the maintenance and improvement of health for community residents. QoI supplied devices for testing and measuring blood pressure, body composition, blood health (simplified test), bone density and oral bacteria, in order to raise the health awareness and interest of residents. Ongoing use of these devices has enabled the collection of health information for each customer over time. QoI also provided a seminar room and an area where customers can freely use a range of devices. The store offers health counseling, seminars and exercise guidance provided by pharmacists and senior nutritionists.

"The relaunch of our Keio Hachioji Store enabled us to open our showcase health support pharmacy with as many measuring devices as possible, so we needed a system for collecting this data," explains Shoji Okamura. "That was when we learned about Fujitsu's health information management platform, which already included functionality for storing a wide range of measurement data collected by pharmacies. The fact that it also enabled linkage to our electronic medical records system, which is central to QoI's business, was another factor in our decision to deploy the platform."

Measurement data collected by testing devices at the store is uploaded in real time to the health information management platform in the cloud. This enables the pharmacist to check the customer's electronic medical record at the same time, thereby providing centralized management of health information and assisting with instructions on taking medication.

## Accessibility to advice that extends beyond simply being a dispensing pharmacy for community residents

According to Shoji Okamura, "The number of customers visiting the Keio Hachioji Store is trending upward, with over 10% growth in the number of prescriptions dispensed." Business head and pharmacist Yoshiko Shono elaborates, "After deploying the health information management platform, we started running seminars, events and customer counseling sessions as part of our new role as a health support pharmacy. Centralized management of customers' internal data from body composition analyzers and a range of other devices, together with information from medical records, has enabled us to accurately provide more tailored food and prescription drug counseling. I believe this is the reason we are seeing more customers."

In November 2016, QoI opened a second showcase health support pharmacy in Tokyo as a trial to target professionals who are typically too busy for health tests and measurements. Shoji Okamura explains the company's plans for future expansion of its health support pharmacy network, "We hope to expand to around

100 stores next fiscal year, with a focus on convenient locations where people usually gather, to link our health support services with drug dispensing."

By increasing the number of networked stores, QoI plans to collect even greater amounts of health data via its health information management platform. Using big data analysis, the company will be able to offer even more comprehensive health advice and instructions on taking medication. By using Fujitsu's cloud platform to strengthen its analytical capabilities, QoI aims for continued future growth as a health support pharmacy.

**Customer Profile**

### QoI Co., Ltd.

Address: 37th Floor, Shiroyama Trust Tower, 4-3-1, Toranomon, Minato-ku, Tokyo, Japan
Founded: 1992
Employees: Permanent: 3,778; Temporary: 1,572 (as of March 31, 2016)
http://www.qol-net.co.jp/en/ir/profile/index.html


## McDonald's UK

# Together McDonald's and Fujitsu have developed the CARE program

McDonald's UK was searching for a more proactive way of managing its restaurants. The company partnered with Fujitsu to co-create the Customer Aligned Regional Engineering (CARE) program and, as a result, has enhanced the customer experience in its franchise stores.

> *Quality information leads to better business outcomes, which drives reliability, leading to more uptime and more satisfied customers.*
>
> *Doug Baker, Head of IT, McDonald's UK*

### Significant deployment of technology led to major challenges

McDonald's has more than 1,250 restaurants in the UK and employs around 110,000 people who work together to deliver the high quality food and service that its customers know and trust. As a franchising organization, around 70% of its restaurants in the UK are owned and operated by local businessmen and women, together serving millions of customers every week.

In 2011, McDonald's UK decided to simplify its onsite maintenance and support. Following a Request for Proposal, it chose Fujitsu to provide a standard break/fix service thanks to the capability demonstrated and the cost-effective model. However, in the intervening years, the company's business has evolved and its support requirements have matured.

"Our business has changed significantly with a significant increase in our use of technology; that meant that the old contract and ways of working needed to evolve," explains Doug Baker, Head of IT, McDonald's UK. "We have around 4 times as much technology in-store, including increased customer facing technologies, which means our reliance on IT is much greater and the need for maximum uptime is even more critical."

McDonald's wanted to design a more agile and proactive way of managing its infrastructure instead of simply responding when things go wrong and incidents arise. The McDonald's team sat down with the Fujitsu team and together they developed a personalized service rather than the one-size-fits-all approach that was previously in place.

"We need to address new market challenges and so we needed a flexible contract that would enable our relationship with Fujitsu to evolve in response to these demands," adds Doug Baker. "Key to this was establishing a more personalized engagement with the

franchisees who make up over 70% of our UK estate."

## Combining the knowledge of both companies allowed the co-creation of a preventative maintenance solution

The McDonald's team collaborated with Fujitsu engineers and solution designers over a series of workshops to identify key learnings from the past 4 years and to plan how the company could best drive down the call volume. After 12 months of careful research and planning, Fujitsu and McDonald's launched the CARE (Customer Aligned Regional Engineering) program.

"The idea was to implement a flying squad of engineers specifically trained in our technology and dedicated to supporting our estate," continues Doug Baker. "By building close relationships with restaurants and franchisees, each engineer can be better positioned to anticipate problems rather than react to them."

Each of the 10 engineers is assigned to a region and is expected to conduct a review of each restaurant at least twice a year. This will enable them to assess onsite equipment and stock levels, undertake training with staff and analyze incident root causes.

Fujitsu has also recreated 2 'live' restaurant environments in its offices in Stevenage, which are fully functioning, as well as built a bespoke McDonald's app for the CARE team.

"CARE is all about being proactive through preventative maintenance, training and education within the framework of a flexible contract that can change to meet our needs as they develop," says Doug Baker. "It's a much more organic approach to problem-solving that promises to help all our stores run more smoothly."

## Aiming to extend the program to become a flexible and reliable tool for decision making

The CARE program brings the McDonald's team much closer, resulting in more informed business decisions.

The principle advantage of the CARE program is that it enables the McDonald's team to get much closer to the reality of how each restaurant is managed. Clearer operational information from the CARE engineers thus ensures smarter overall business decisions can be made.

"It's giving us a joined-up view of the estate so we know, for example, exactly how many spare pieces of kit each restaurant should have based on size and footfall," comments Doug Baker. "That way we are anticipating and mitigating against hardware failure."

This new direct line of communication between the CARE team and each restaurant means that it has become much easier to share best practice. For example, when one particular printer continually broke down and was facing replacement, the CARE engineer pointed out that it simply needed to be moved further away from the fryer, based on prior knowledge from another site.

"Quality information leads to better business outcomes, which drives reliability, leading to more uptime and more satisfied customers," says Doug Baker. "CARE allows us to predict and resolve issues more effectively as well as giving us the ability to test new kit through the lens of real experience in Stevenage."


CARE program has only recently launched but already the response from owners and franchisees has been impressively positive. Initial feedback suggests that already the CARE engineers are resolving long-standing issues and helping restaurants operate more efficiently.

"CARE is providing a flexible yet dedicated team of engineers that can help us predict problems before they arise and so avoid downtime in-store," concludes Doug Baker. "As the needs of the business evolve we will be able to constantly tailor the CARE program to meet them."

**Customer Profile**

### McDonald's UK

Address: 11-59 High Road, East Finchley, London, United Kingdom
Founded: 1974
Employees: 110,000
URL: www.mcdonalds.co.uk

[Internal case] **Fujitsu Limited**

# Workstyle transformation supported by a Global Communications Platform

The Fujitsu Group employs 156,000 people around the world and in 2010 began developing a Global Communications Platform to enhance internal communication. The company started by standardizing the tools and transformed workstyles through web conferencing and an internal social network. A multi-cloud environment was then implemented that combined FUJITSU Cloud Service and partner's cloud service to ensure all elements would operate as a unified entity. From April 2017, Fujitsu will implement a Telework System based on this environment.

> *By combining the K5 cloud service which supports multi-cloud environments and partner's cloud services, such as Office 365 and Box, we have created a communications platform that enables workstyle transformation.*
>
> *Takahiko Kouketsu*
> *SVP, Head of IT Strategies Unit,*
> *Fujitsu Limited*

## A Global Communications Platform with some regional variations

As a global business employing 156,000 people across the world, Fujitsu Limited (Fujitsu) began developing a new Global Communications Platform in 2010 to promote workstyle transformation and innovation.

As a first step, Fujitsu started the process of unifying its communications platforms in 2010. Head of IT Strategies Unit, Senior Vice President Takahiko Kouketsu comments, "Our aim was to enable all 156,000 employees around the world to use the same tools for email, schedule sharing, web conferencing and other tasks."

In 2013, Fujitsu took the second step by focusing on transforming workstyles through the adoption of an internal social network for knowledge sharing and a softphone system for voice communications. Then from 2015, while increasing the quality of information sharing through higher quality video and other content, the company deployed a virtual desktop system to support a wide range of workstyles and also bolster security.

Use of the Global Communications Platform is already generating solid results. For example, 95% of the Fujitsu workforce actively participates in web conferencing, with 1.7 million meetings expected during the fiscal year to March 2017. According to Takahiko Kouketsu, this represents "an annual saving of several hundred million yen for business travel expenses in Japan alone." As of January 2017, there are also 4,500 communities on Fujitsu's internal social network, with 20 patent applications resulting from these community activities.

However, the operational situation in 2015 was such that the communications platform was being provided via various Fujitsu data centers around the world using on-premise software. "Differ-

ent circumstances in each region resulted in variations in the rollout speed and the functionality available to users," comments Takahiko Kouketsu.

## Migration to a global cloud platform leads to greater unification of communications capabilities

To eliminate differences between regions, it was necessary to transform the communications platform into a unified entity, which is why Fujitsu chose to run it in a global cloud environment. Naturally, the cloud service selected to underpin the platform was FUJITSU Cloud Service K5. The solution also employed the FUJITSU Digital Business Platform MetaArc framework to deliver a multi-cloud environment that provides rich functionality in collaboration with partner cloud services.

One of these partner cloud services is Microsoft's Office 365, which provides a range of core functionality that includes email, schedule sharing and web conferencing. "When we started planning the global unification of our communications platform, our Group companies outside Japan were using Microsoft's Exchange Server for handling email," explains Takahiko Kouketsu. "That is why Fujitsu adopted Exchange Server for email, SharePoint Server for information sharing and Lync (earlier edition of Skype for Business) for web conferencing. The optimal choice for putting these functions in the cloud was via Office 365."

The K5 cloud service provided additional functionality, including user authentication, portals, Print Anywhere capability (allowing printing from any multifunction device in any Fujitsu office), video content and storage. Box, with its strengths in collaboration and security, was deployed to partner clouds for file sharing.

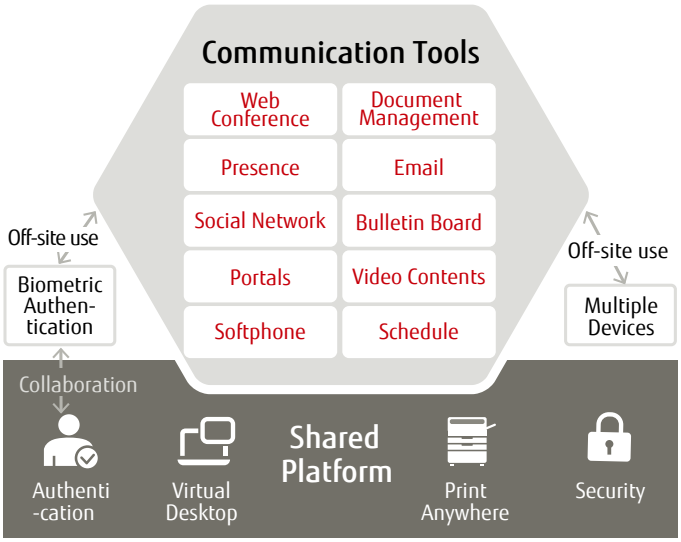
Migration of on-premise Exchange Server data to Office 365 began in March 2017. This is being phased in gradually in a way that, according to Takahiko Kouketsu, is "invisible to users," and the migration is expected to be completed by March 2019.

## Further enhancement for teleworking

Using the Global Communications Platform, which is still in the process of migration to the K5 cloud service, Fujitsu is rapidly driving collaboration and workstyle transformation within the Group.

One feature that is particularly effective for global collaboration is presence functionality, which uses a personal profile database and allows easy confirmation of a person's availability and whereabouts. Employees' personal profiles include information such as their ID photo, title and role, thereby encouraging communication even between people who have not met directly. It is also possible to automatically list the documents created by an individual via a link in their email address, as displayed in a received email message.

As part of its workstyle innovation efforts, from April 2017 Fujitsu will officially implement in Japan a Telework System built on the Global Communications Platform. To enable an appropriate workstyle from home, from a satellite office, or while traveling on business, the Telework System will use a combination of a working




hours management system and the FUJITSU Software ID Link Manager II tool for managing time and overtime at work. "Connecting Fujitsu's Human Centric AI Zinrai artificial intelligence technology with the Global Communications Platform will also provide automatic schedule coordination and translation of both voice and text," concludes Takahiko Kouketsu.

Fujitsu is now offering to customers a Global Communications Platform solution, backed by the expertise gained from its in-house implementation and operation. In the future, the company also plans to commercialize the knowledge behind its Telework System.

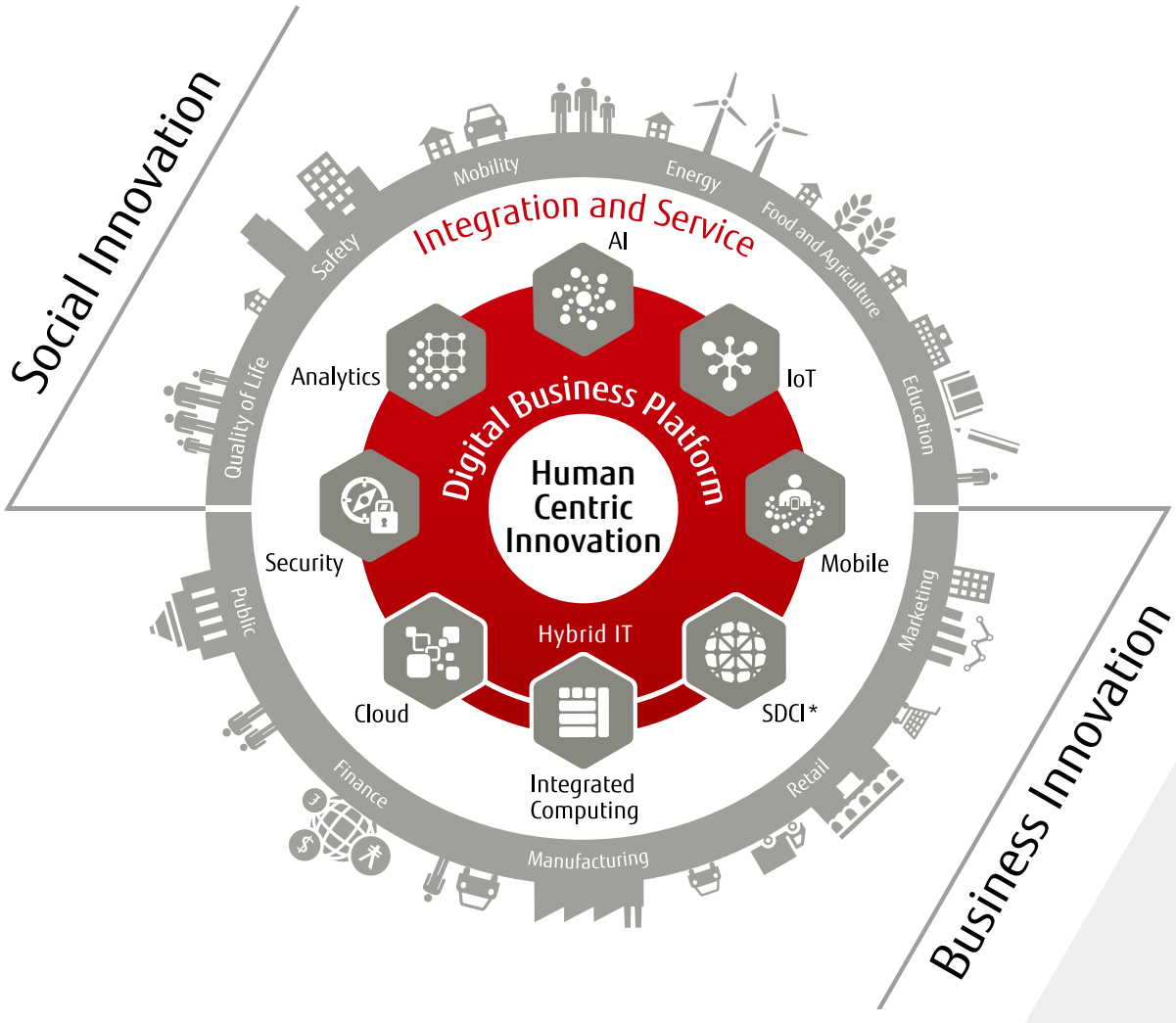
### Fujitsu Limited

Address: Shiodome City Center, 1-5-2, Higashi-shimbashi, Minato-ku, Tokyo, Japn
Founded: 1935
Employees: 156,000 (worldwide as of March 2016)
URL: http://www.fujitsu.com/global/

# Fujitsu's Broad Portfolio for Connected Services

To meet the needs of customers in the digital era, Fujitsu provides Connected Services, which create value by connecting everything and learning from data to generate intelligence. Fujitsu's MetaArc is the framework enabling these Connected Services.
Now, Fujitsu is investing heavily in digital technology to deliver digital services through MetaArc. In addition, we provide a range of Hybrid IT products and services, combining our long experience in highly reliable systems and our cutting-edge expertise in scalable digital technologies. Fujitsu securely integrates a diverse spectrum of digital services and Hybrid IT to enable our customers' digital business.

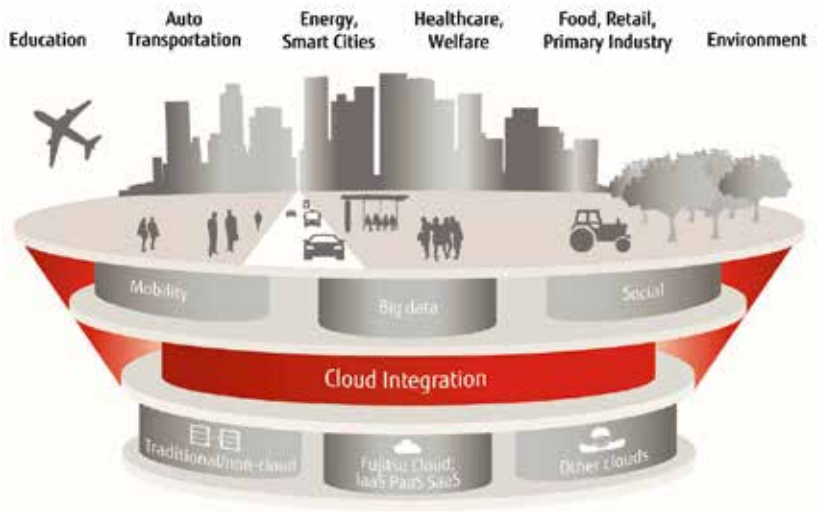
- Integration and other services for Digital Co-creation
- Digital Services (Mobile, IoT, AI and Analytics)
- Hybrid IT (Cloud, Integrated Computing and Software-Defined Connected Infrastructure)




* SDCI: Software-Defined Connected Infrastructure

# Integration

Fujitsu delivers next level solutions for customers in a competitive environment. Leveraging the latest industry trends, advanced system development and business expertise, Fujitsu provides end-to-end integration services from planning to system operation.




## Services, Products and Solutions

### Services

#### Business and Application Services

Fujitsu's Business and Application Services leverage innovation from the Fujitsu group and partners, delighting our customers via an industry led approach,with a focus around complex systems integration that enables our customers' digital transformation. In balancing new and existing technology commitments, our comprehensive business and application services are ideally placed to help customers successfully deliver their key transformation initiatives. Fujitsu provides a full range of application services to support the customers' development, integration, testing, deployment and ongoing management of both custom developed and packaged applications.

##### ■ Business Consulting and IT Consulting

Through its approach to consulting Fujitsu drives greater strategic impact for clients, both within Digital and Robust IT. Fujitsu enables customers to achieve greater operational efficiencies, performance and maximize the ROI of current existing and planned IT implementations and business strategies. Fujitsu helps organizations to formulate strategies through services including business case development, road-mapping and assessment services. Fujitsu helps organizations understand what is the best technology to use to achieve business objectives, whilst understanding emerging technologies. Consulting services around technology include: IT Strategy and Effectiveness, Application Value Assessment, Data Center Assessment, and IT Service Management. Fujitsu manages every aspect of business change to ensure that the impact on an organization is minimal, and help to optimize business processes using LEAN and automated approaches. Throughout, Fujitsu uses a cost-effective output-focused consultancy approach called XpressWay which offers your organization maximum consulting impact at a cost controlled by you.

##### ■ Application Development and Integration

Application Development and Integration Services help customers respond to change by defining and delivering application transformation projects. Fujitsu's experience in dealing with complex multi-vendor environments and emerging trends/technologies, ensures that projects are managed professionally and on budget. Offerings include: (Mobile) Application Development, Systems Integration, Application Modernization and Transformation, DevOps consulting and implementation, Cloud native application development, Rapid Application Development, Transformational Application Managed Services, and Testing.

##### ■ Innovative Application Services

To help our customers benefit from digitalization, Fujitsu is rapidly expanding a range of innovative, vertical focused offerings to address specific industry challenges. Examples include Retail Analytics, Smart Ticketing for the transport sector and Augmented Reality for utilities.

##### ■ Application Management and Outsourcing

Fujitsu recognizes that organizations have invested a lot in their current application landscape so we ensure that the investment is not lost and unlike many of our competitors Fujitsu does not singularly promote a technology. This enables organizations to create business value and agility, and to derive maximum value from the application landscape.
With the introduction of Transformational Application Managed Services (Transformational AMS) Fujitsu provides an end-to-end offering for supporting the application framework to ensure it meets the changing needs of organizations adopting digital technologies. Fujitsu is helping organizations to transform in this fast changing world through an integrated bi-modal approach which builds the bridge between the digital world and existing business operations. This includes proactive management of the global applications landscape, to keep the business running and up-to-date; innovations driven by business insights to identify and drive change, for greater business impact; and automation-centric transformation to enable the rapid realization of goals.

# Services, Products and Solutions

## Services

## Business and Application Services

### ■ Enterprise Applications

Fujitsu's Enterprise Applications services cover the design, development, configuration, implementation, rollout and ongoing management of solutions based on packaged ERP applications. Fujitsu provides scalable services for market leading software products such as SAP and Oracle, covering core business functions including finance, HR and supply chain management.

■ SAP Services

Enterprises around the world have made significant investments in SAP applications that are recognized by customers as core or even motor for their digital journey. As a trusted SAP Global Partner for over 40 years, Fujitsu offers a complete range of tailored, future-proof SAP services that help customers simplify, innovate and grow. We are driving innovation across all areas of financial and operational performance–from cloud services via managed SAP operations to solutions and services.

■ Oracle Services

With a 30+ year strategic relationship with Oracle, Fujitsu is a Global end-to-end Oracle Solution Partner with over 60 Specialization certifications across the Oracle stack that encompass Cloud, Hosting / Hardware, Systems Integration and Application Managed Support. Fujitsu balances the business requirements for Fast IT, digital transformation and cloud with existing technology commitments, to help customers successfully accomplish their key transformation initiatives with Oracle's leading technology and Fujitsu Oracle Innovation. Fujitsu and Oracle Cloud Applications transforms back office processes to make our customers more agile, efficient, attractive and profitable. In addition of customers across regions, Fujitsu has demonstrated expertise and knowledge to help our customers on their journey to cloud applications by transforming its own HR department across 38 countries with Oracle HCM Cloud Module.

■ Intelligent Enterprise Services

Digital transformation and demographic challenges in the workforce mean organizations need to both adapt at pace, and utilize insights to power customer engagement and business operations. They will need to adopt new ways of working, within new organizational structures supported by more modern, flexible technologies. The Intelligent Enterprise Services covers Advanced Analytics, Collaboration Solutions, Enterprise & Web Content Management, and Case & Document Management supported by Business Intelligence, Social Intelligence and Secure Integration services. We leverage partner technologies like Microsoft Office 365 and Azure, alongside our own Fujitsu solutions such as Valo or CaseM.

■ Software as a Service (SaaS)

Fujitsu offers implementation, configuration and integration services to support the delivery of market leading SaaS solutions including ServiceNow, Salesforce.com and Microsoft Office 365.

■ Application Modernization and Transformation Services

Enabling customers to more easily migrate or modernize legacy applications to reap the benefits of cloud services, minimizing the risks and costs – and giving them greater flexibility for the future.
Application Transformation comprises :

- Application Assessment: discovery of application landscapes; identification and planning of applications modernization, cloud deployment and (business) process optimization opportunities
- Application Modernization: modernize legacy applications to future proof technology and platforms, utilizing the cloud without moving the entire application to the cloud - for instance, moving the front end or database.
- Application Migration: migrating entire applications to Hybrid cloud environments.
- Robotic Process Automation – automation and optimization of business processes and (human) application interactions
- Innovation – adoption of innovative technologies like Artificial Intelligence and Mixed Reality (Augmented and virtual reality)

## Managed Infrastructure Services

Fujitsu's Managed Infrastructure Services provide a cost effective, reliable and flexible ICT infrastructure to customers. This infrastructure may be owned by the customer or Fujitsu. Our services comprise Data Center Services, End User Services, Service Desk, Technical Support Services, Cloud, and Network and Communication Services as well as Cyber Security Services, as described on page 59.

### ■ Data Center Services

Fujitsu's Data Center Services provide our customers with the complete range of services to ensure their IT systems are fully operational for their users as well as to improve their IT flexibility, efficiency, performance and to reduce their costs. Our operational Datacenter Services comprise:

- Datacenter Outsourcing where we take on the responsibility for managing and transforming your services.
- Remote Infrastructure Management (RIM) for servers, storage and other Data Center and cloud hosted infrastructure.
- Managed Hosting for Cloud and non-cloud systems: backup and recovery services as well as Data Center network services.
- In addition Fujitsu has technical consultancy and project services that enable us to undertake assessment, advisory, migration and transformation projects for our customers - either as part of a wider outsource or as part of the customer's journey towards cloud infrastructure.
- As part of the transformation of customer infrastructure we provide FUJITSU Cloud Service K5. Designed for organizations that want a choice of services on demand, our K5 allows you to take any workload into the cloud – whether you need a trusted public, private hosted, private or a hybrid cloud environment.
- Fujitsu Cloud Service K5 also offers Platform as a Service (PaaS) capability to support migrating mission-critical applications to cloud, integrating new digital initiatives with existing IT systems as well as developing new cloud native applications. To help transition and transform applications we offer blueprinting, orchestration, native application development and API integration.

### ■ End User Services (EUS)

Fujitsu's End User Services enables organizations to create a truly digital workplace, by securely connecting people, data and applications in order to transform the way in which they work. Our managed service allows you to deliver a fully personalized and contextual user experience at scale. Using any enabled device and leveraging the best in consumer technology, employees can securely access the information they need anywhere, anytime. The result is a more agile, collaborative and productive workforce, creating the value your business needs, and a workforce that's ready to drive innovation rather than just keeping up with it.
Fujitsu's Digital Workplace is an integral part of our End User Services portfolio and brings together our workplace and support services into a harmonious whole. Our End User Services offerings encompass Desktop Managed Services, Virtualized Workplace Services, Enterprise Managed Mobile services and Workplace Productivity services. Regardless of the size and complexity of your workplace environment, we take a co-creative approach to help you find the right balance of performance, costs, and security to deliver a personalized and flexible workplace your organization needs.

# Services, Products and Solutions

## Services

### ■ Service Desk

Fujitsu's Next Generation Service Desk , the Social Command Center, delivers a user-centric, omni-channel support service that's powered by AI, virtual assistants and cognitive learning. Delivering a 24/7/365 support service covering everything your business needs from human resources to IT, through a single point of contact to empower users to self-serve and quickly get back to being productive. Fujitsu is a market leader with extensive experience in delivering support services on a global scale. We have 5 delivery center worldwide in Costa Rica, Malaysia, Poland, Portugal and the Philippines, delivering multilingual support covering more than 30 languages and in over 160 countries. And we use TRIOLE® for ServiceNow for our core set of service management processes and toolsets. Our Next Generation Service Desk makes use of and combines emerging technologies and perfectly aligns with your changing user demands. It can either be integrated into our End User Services portfolio, or if preferred, used as a standalone. In addition, you can balance cost and service by choosing either a dedicated or shared Service Desk, or you can combine elements of both.

### ■ Technical Support Services

Predictive and preventative, Fujitsu IT support perfectly aligns to your business priorities. Fujitsu is one of the largest IT support service providers in the world, with over 35 years of experience delivering technical support to customers around the globe. We understand that every business is different, which is why we have evolved our engineering services to deliver a more preventative and intelligent support services that is aligned to support your individual business needs. Our intelligent engineering services use data analytics to predict potential problems before they occur and prevent them from ever happening, to ensure your business remains up and running 24/7/365. In doing so we drive down incident rates, minimize issue resolution times, reduce downtime and deliver cost efficiencies.
At Fujitsu, we recognize the negative impact outages can have on revenue, business reputation and customer satisfaction, which is why we have developed a support service offering that provides far more than the standard reactive delivery model. We continually look to improve and innovate, be this through our ConnectIT Bar service that provides end-users with a walk-up service delivered in Head Office locations, or through our CARE service*[11] that provides dedicated expert engineers who deliver proactive issue resolution, training and support to retail locations. Fujitsu IT support includes multivendor hardware and software products, and specialized retail systems. Our Managed Rollout & Lifecycle Support Service delivers the right systems, to the right place, at the right time. This includes mass rollouts, automated or customized installations, de-installations, relocations and upgrades. Our rollout and project management expertize covers installation, localization analysis, system disposal, data migration and training.

*11 For details please see page 42 "Together McDonald's and Fujitsu have developed the CARE program / McDonald's UK

## Products

## Software

Fujitsu is the only Japanese vendor with a systematic software product lineup. Fujitsu integrates optimal systems according to customer needs and objectives, based on a core lineup of proprietary technologies and products combined with supplementary partner software products and open-source software.

### ■ Middleware

**■ FUJITSU Software Interstage Business Operations Platform**

This solution integrates multiple business systems using a web service, supports companies in developing new business processes. The solution has a wide range of features, including connectors that link existing SAP systems and other business packages as web services without requiring application revisions or connection add-ons, processes, data connectivity, and user interfaces. With this single solution, companies can build services that support new business processes.

**■ FUJITSU FlexFrame Orchestrator**

Fujitsu's innovative FlexFrame Orchestrator solution enables operating SAP applications, databases and the SAP HANA platform easier, faster and more effectively. It simplifies the management of complex SAP environments, optimizes planning, operation and change management and reduces costs by up to 90% while increasing agility by up to 50%. Comprising most advanced orchestration and administration capabilities, FlexFrame Orchestrator is an optimized operational concept for the entire SAP landscapes.

## Integrated Systems

Under the name of FUJITSU Integrated System PRIMEFLEX, Fujitsu provides a broad lineup of Integrated Systems. PRIMEFLEX encompasses factory-installed solutions which are ready-to-run and reference architectures which can be easily adjusted to customer-specific requirements. Both options are supplemented by truly attractive service offerings. (For a full description, please see the 'Integrated Computing' section on page 56.)

### ■ SAP

**■ FUJITSU Integrated System PRIMEFLEX for SAP Landscapes**

FUJITSU Integrated System PRIMEFLEX for SAP Landscapes allows a rapid high-quality implementation of infrastructure for SAP applications and databases including new developments like S/4HANA. It is designed, delivered and supported as one product. The integrated FlexFrame Orchestrator software offers consistent and standardized administration of infrastructure, databases, and applications. This makes operation more reliable and dramatically boosts responsiveness throughout the business enterprise.

**■ FUJITSU Integrated System PRIMEFLEX for SAP HANA**

PRIMEFLEX for SAP HANA is backed by 40 years of experience in delivering fast, secure, high availability implementations with optimized TCO, successfully reducing complexity. Fujitsu's SAP HANA expertise, infrastructures and services enable customers to fully exploit the potential of the SAP HANA platform (For more information, please see the ' Analytics' section on page 53.)

**■ Servers:**

Our portfolio of FUJITSU Server PRIMERGY is comprised of different form factors, optimized for several workloads ranging from basic file server, collaboration and messaging platform support to high performance tasks. Regardless of what is in between: a perfect integration in existing infrastructures always plays a major role. Moreover, our PRIMERGYs are, next to ETERNUS Storage and powerful network, middle- and software elements, the solid foundation of our PRIMEFLEX solutions.

# Services, Products and Solutions

## Solutions

### Industry Solutions

Fujitsu's long and comprehensive global experience means we have been able to develop expertise across a number of industries. Working together with customers we drive value by utilizing industry specific expertise.

- Retail *Featured below
- Automotive
- Healthcare
- Life Sciences
- Financial Services
- Manufacturing
- Telecommunications
- Energy and Utilities
- Public Sector
- Defense and National Security
- Education
- Logistics
- Distribution
- Food and Beverage
- Betting and Gaming
- Media

#### FUJITSU Retail Solutions

Fujitsu is delivering comprehensive value for over 500 retailers in 52 countries and powering over 82,000 stores worldwide. With more than 30 years' experience in retail and a broad portfolio of retail solutions backed by enterprise ICT products and services, we are focusing on three core capabilities that ultimately deliver retailers a differentiated customer experience under the ethos of 'Connected Retail'.

**- Innovative retail solutions**
To support and future-proof the customer experience in today's multichannel world; this includes Fujitsu Market Place - our omni-channel PoS application - and new solutions from our innovation labs around the world.

**- Connected enterprise**
Linking applications, information and communication within the store, between the front and back office, and between multiple vendors to deliver a seamless and integrated customer journey, including enterprise solutions, and outcome-based enterprise services.

**- Global delivery**
The assets and capabilities to deliver consistent cross-border solutions.

#### Intelligent Society Solutions

Utilization of ICT has gained popularity in social infrastructure fields such as Food, Agriculture, Health & Medical care, Transportation, Education and Energy. Aimed at addressing various social challenges in these fields, Fujitsu is continuously creating new value through innovative ICT such as cloud and mobility solutions.

- **FUJITSU Intelligent Society Solution RFID and Sensor Solution**
- **FUJITSU Intelligent Society Solution Akisai**
- **FUJITSU Intelligent Society Solution SPATIOWL**

#### Technical Computing Solution

Building on our long-standing history of innovation, 30 years of experience in the development of supercomputers and the exceptional depth and breadth of our offering, we provide the enabling technologies and services for a wide range of aerospace, meteorology, astronomy, healthcare and industrial projects. We have also teamed up with numerous prominent research agencies to design bespoke solutions for the most varied and challenging technical computing applications.

- **FUJITSU Technical Computing Solution TC Cloud**

#### Sustainability Solutions

Balancing economic, social, and environmental sustainability presents both opportunities and challenges for modern-day businesses. Organizations that understand the need to use their ICT innovatively while focusing on its optimization, resource and energy efficiency will gain from both a business advantage as well as social responsibility. Fujitsu helps your organization optimize the efficiency of its ICT equipment and data centers, saving you money and reducing greenhouse gas. Our Enterprise Sustainability services align your sustainability objectives with your business goals for sustainable growth.

- **FUJITSU Enterprise Sustainability Consulting**
- **FUJITSU ICT Sustainability Framework**
- **FUJITSU ICT Sustainability Benchmark**

#### Workplace Services

Workplace Services (For a full description of 'Workplace Services', please see the 'Mobile' section on page 51.)

### Infrastructure Solutions

Infrastructure Solutions typically consist of various IT components and combine them to serve specific usage scenarios. Decades of experience and collaboration with leading software vendors have enabled us to offer platform-specific as well as platform-independent operating and management solutions and frameworks that provide best-in-class quality.



Note: Availability featured here may differ by region.

# Mobile

Fujitsu's mobile solutions help to empower people and raise productivity – anywhere, at any place - by delivering a personalized services experience. Using desktops, laptops, or smart devices, employees can access the applications, data, and tools they need, while organizations have peace-of-mind security.

## Services, Products and Solutions

### Services

#### Managed Infrastructure Services

##### ■ End User Services (EUS)

Fujitsu's End User Services enable organizations to create a truly digital workplace, by securely connecting people, data and applications in order to transform the way in which you work. Our managed service allows you to deliver a fully personalized and contextual user experience at scale. Using any enabled device and leveraging the best in consumer technology employees can securely access the information they need anywhere, anytime. The result is a more agile, collaborative and productive workforce, creating the value your business needs, and a workforce that's ready to drive innovation rather than just keeping up with it. Our end user services offerings encompass Desktop Managed Services, Virtualized Workplace Services , Enterprise Managed Mobile services and Workplace Productivity services.

**■ Workplace Services**

We deliver desktop virtualization alongside our traditional managed desktop services. Our proven approach puts together the right mix of local and virtualized desktops to help you meet the specific needs and expectations of your people. What's more, as your requirements evolve and change over time, we can flex the cloud-based services and increase the services that we provide virtually. In addition, we give your people a secure way to work remotely from a wide range of devices and provide control for device policies. These can include bring your own device, (BYOD), choose your own device (CYOD), corporate-owned, personally-enabled (COPE), and others. Fujitsu's proven approach to desktop virtualization provides a workplace platform which enables your workforce to securely and seamlessly work and collaborate from anywhere, at any time via devices of their choice. We can deliver services based on hosted solutions or solutions that are deployed on premise, we offer on-demand multi-tenant or dedicated infrastructures - designed and managed to provide the high levels of availability needed to underpin the productivity goals of any business; while protecting the key information assets precious to that business.

With our cloud-based integrated Microsoft workplace solution, we can help you drive digital workplace transformation, and make your people more collaborative, productive and innovative. Your employees will be able to seamlessly and securely use tools in Windows 10, Office365, Azure and Intune. Our rapid, standardized delivery route is well proven, and makes integrating technologies easier. And we can give your people secure access to apps, content and services, as well as automatic updates so that they're never out of date.

**■ Enterprise Managed Mobile Services**

Our matrix of end-to-end mobility solutions lets your users access all their apps on a wide range of iOS, Android and Windows devices, in a secure, controlled environment. When you need to set up multiple users, our managed deployment services can save you thousands of hours. App-management tools make it easy to control how your people access their mobile services; meanwhile, application wrapping and packaging services empower you to set and enforce policies and make sure they're followed.

**■ Workplace Productivity Services**

Our Workplace Productivity Services are at the heart of Workplace Anywhere. By combining evergreen cloud services, such as Office365, with our experience in security, and by delivering mission critical business applications, your employees can be sure they'll have access to the tools they need to be productive. With our extensive unified collaboration and communication capability, you can help your workforce keep in touch and work closely together, which is essential in a mobile environment. And with our experience in bringing these tools together securely, you can extend this to customers and suppliers, without fears of data loss.

### Products

#### Client Computing Devices

Fujitsu empowers organizations to meet the requirements of today's social and demographic trends which result in new ways people live and work. This also helps businesses to reach out to a new generation of employees, while gradually moving toward digital work processes and enabling employees to reach a satisfactory work-life balance. Fujitsu is a leading provider of mobile and stationary devices for corporate customers. Fujitsu's tablets have become the standard in a wide variety of environments including government, healthcare, sales force automation, and education. In addition, customers have come to depend on the reliability, quality, innovation and human-centric technology of Fujitsu products. Furthermore, Fujitsu offers a complete range of environmentally conscious products and uses environmentally friendly technologies and processes throughout the entire product lifecycle.

##### ■ Notebooks and Tablets

The FUJITSU LIFEBOOK Notebook and STYLISTIC Tablet portfolio empowers the user through powerful performance wherever the workplace, whatever the industry. Premium technology, unique biometric security, a comprehensive family concept, configuration options and innovative solutions interconnect to grant customers the freedom and reassurance to work with competence, stamina and style.

##### ■ Desktops

The FUJITSU ESPRIMO family brings a complete range of fully featured and highly expandable desktops that dependably run the office applications of today and tomorrow. Their superior reliability comes from best-in-class Fujitsu development and outstanding production quality. The world's most efficient power supplies lower your energy bill and reduce your environmental footprint. With individual configuration options and the unique manageability solution, ESPRIMO Desktops help to reduce deployment costs and flexibly manage each system for years to come.

##### ■ Workstations

Engineered and built in Germany and Japan, CELSIUS workstations from Fujitsu support creativity, simulation, calculation, Virtual Reality and visualization at the highest professional level. Thanks to the end-to-end capabilities from design, engineering to production, CELSIUS workstations have gained a great reputation for being whisper quiet, offering ingenious thermal management and cooling as well as reaching world-leading benchmark results. All mobile, desktop and rack workstations are optimized for use with a host of leading workstation applications, like Autodesk, Dassault Systèmes, Siemens PLM or PTC.

##### ■ Thin Clients

For optimized server-based computing or desktop virtualization, choose customizable FUJITSU FUTRO Thin Clients. Every device is designed and engineered to support best performance, security, easy manageability and cost-effectiveness. They also deliver significantly lower TCO over their lifecycle compared with a standard PC. Plus, ease-of-use, standardization and quiet operation ensure maximum user comfort.

##### ■ Smart Devices

Fujitsu offers a diverse lineup of smart devices that can be tailored to customer needs. Fujitsu's smartphones and tablets are equipped with proprietary human centric technology that enables ultimate connectivity and smart functions for daily lives, such as 4G/LTE connectivity and intuitive touch-panel operation, and other features.

##### ■ Peripherals

Efficient working requires seamless interaction between your IT systems and users. Fujitsu delivers a comprehensive range of intuitive, useful peripheral products covering displays, human input, storage, connectivity, carrying cases, biometric security, multimedia, dot matrix printers and wearables. All peripheral products guarantee optimal compatibility across all Fujitsu systems. This consistency, together with the comprehensive range of peripherals available, enables "one-stop shopping". That adds up to time and money saved during purchasing and compatibility verification.

### Solutions

#### Infrastructure Solutions

##### ■ Fujitsu Digital Workplace

Fujitsu's Digital Workplace is an integral part of our end user services portfolio and brings together our workplace and support services into a harmonious whole. Regardless of the size and complexity of your workplace environment , we take a co-creative approach to help you find the right balance of performance, costs, flexibility and security and remove any risk from transforming your workplace when moving to a digital workplace.



Note: Availability featured here may differ by region.

# IoT and Hyperconnected Business

IoT is a core enabler for the future hyperconnected business and a key driver of digital transformation & business innovation. Hyperconnectivity will see the connection of people, information and things in ways that fundamentally change business and society. The World Economic Forum in 2014 stated that Hyperconnectivity will be to the 21st Century what the internal combustion engine was to the 20th Century.

Fujitsu aims to create an environment to support innovation on a proven IoT platform, powering digital transformation with IoT solutions and services for the transformative enterprise. Our strong portfolio of our own intellectual property is combined with a broad ecosystem of partners. Our IoT solutions range from enterprise wearable devices, middleware software, cloud platforms to standardized business solutions for customer verticals. They leverage both our own, and partners, expertise in analytics and AI.

| | |
|---|---|
| SEE MORE | Know what's really going on – in real-time |
| PREDICT DON'T REACT | Anticipate problems and be first to spot new opportunities |
| POWER INNOVATION | Unlock new ways to create value for customers - and enable new business models |
| ACT FAST | Make the right decisions, quicker |
| OPTIMIZE EVERYTHING | Streamline and automate key processes – and ways of working |

A hyperconnected business will be able to exploit the data and insights from IoT to ultimately: see more; act faster; predict rather than react; optimize every aspect of their business; and change the way they create and deliver value.

Being a Hyperconnected Business means better informed business decisions, faster business growth, significant competitive advantage, individual empowerment and operational efficiencies.

## Services, Products and Solutions

### Services / Solutions

#### IoT Business Solutions

Fujitsu' long and comprehensive global experience means we have been able to develop expertise across a number of industries. For customers who are exploring the opportunity to transform their business using IoT, we work with them to co-create solutions specifically for their needs. To support our co-creation approach we have invested globally to build out our design thinking capabilities, digital transformation spaces and industry consulting teams.

To more rapidly address more common industry needs, Fujitsu has created an approach that we call Digital KATA (Knowledge and Templates for Action). Our Digital KATA consist of pre-defined, packaged solutions and services that deliver IoT solutions in a range of industries. By identifying common challenges in the hundreds of IoT projects we conduct every year, Fujitsu is able to deliver these field-proven solutions to customers quickly and cost effectively.

Fujitsu has developed Digital KATA across many industries, including: Smart Utilities & Energy, Smart Manufacturing, Factory Management Optimization, Smart Transportation & Logistics, Smart Retail, Smart Automotive, Smart Financial Services, Smart Cities and Smart Agriculture.

#### Applications & Analytics

Connections create data and real-time access to information and the insights they deliver are crucial in optimizing business models. We provide various applications that can be used to power and derive value from IoT-generated data. Fujitsu's Enterprise Applications services cover the design, development, configuration, implementation, rollout and ongoing management of IoT solutions based on packaged software applications. Additionally our Application Development and Integration Services ensure a smooth and efficient integration of all building blocks, as well as the integration of the overall solution into the customer's IT landscape.

#### IoT Infrastructure solutions

Key to successful IoT deployments is being able to manage devices and sensors both centrally and at the edge. In edge computing, particularly related to M2M and RFID, Fujitsu has gained a proven track record as a System Integrator leveraging its GlobeRanger iMotion platform. We are also rolling out globally our Cloud IoT Platform which sits in our Public Cloud Service K5. This platform provides data management, aggregation, and analytics alongside application development and device management capabilities.

#### Cloud, Infrastructure, Networks

Today's hyperconnected world means billions of elements generating data and a huge increase in the number of people using streaming services. The network of the past is no longer adequate. The entirety of computing, wide-area networking, and M2M communications will be abstracted and controlled by intelligent software. In addition to the next-generation Cloud IoT platform mentioned above, we also support a range of options for quickly building and scaling private clouds and hybrid clouds. (Please see Cloud section on page 54 and Network section on page 58 for more information, and see page 57 in the server section for more information)

#### Enterprise Wearables, Devices, Sensors

Ranging from embeddable sensors to smart tags and badges, to fully integrated Vital Sensing Bands and Head Mounted Displays, while building on the base of its Human Centric Engine, we offer UBIQUITOUSWARE as the front-end interface for Human Centric IoT.

# Analytics

Fujitsu helps organizations to ensure their business is generating maximum ROI across their customers and operations by placing data and analytics at the heart of what they do. Fujitsu delivers end-to-end smart data and analytics approaches, based on advanced technology and analytical expertise utilizing best of breed technologies.

## Services, Products and Solutions

### Services

#### Business and Application Services

##### ■ Business Consulting

■ **Big Data Consulting Services**

Fujitsu's Big Data Consulting Services are designed to identify the opportunities and implications of Big Data for the business. Business- and customer-specific use cases, and their business implications and value are jointly elaborated and prioritized. Fujitsu supports the development of Big Data strategies and detailed evaluation of required capabilities and technologies. Business and IT prerequisites to achieve the business goals are made transparent.

##### ■ Analytics Services

At Fujitsu we work in partnership with your organization to understand your business requirements and needs and how you can truly leverage the power of Big Data. Using the best of breed technologies, Fujitsu can provide a range of Big Data platform solutions matched to your requirements which can be deployed on premise, cloud or hybrid and all supported by our full SMART Analytics and Technology Services.

Our SMART Analytic Services are based on capabilities including Data Strategy and Enhancement, Customer Intelligence, Customer Management and Channel Optimization. Other specialisms include risk and fraud, IoT and Operational Analytics, as well as Location and Retailer Analytics. We deliver tried and tested analytical programs providing the key building blocks to enable you to gain a competitive advantage across a number of areas.

We also offer Business Intelligence through IoT to predictive and prescriptive analytics. We utilize Fujitsu and Hyper-scale public cloud solutions to give you the scale, flexibility and speed you need to drive your business forward.

##### ■ Application Development and Integration

■ **Integration Services and Maintenance Services**

Big Data infrastructure solutions are typically combinations of concepts and technologies. Fujitsu Integration Services ensure a smooth and efficient integration of all building blocks, as well as the integration of the overall solution into the customer's IT landscape. In addition, Fujitsu will take over the maintenance of the overall solution.

##### ■ Software as a Service

Fujitsu offers a wide range of packaged applications as subscription-based services. (For a full description of 'Software as a Service' and offerings, please see the 'Cloud' section on page 48.)

##### ■ Platform as a Service

FUJITSU Cloud Service K5 provides a rich set of Platform as a Service (PaaS) capabilities which provide customers with rapid application development and deployment so they are able to quickly respond to new market requirements. (For a full description of 'Platform as a Service' and offerings, please see the 'Cloud' section on page 54.)

#### Managed Infrastructure Services

Fujitsu's Managed Infrastructure Services for Big Data comprise the complete range of services to ensure our customers' IT systems are fully operational while improving their flexibility, efficiency, performance and reducing costs. We utilize the power of our Big Data and Analytics platform to develop algorithmic models to provide Service Intelligence that underpins all our infrastructure offerings. Through a combination of operational data and ticket information from various systems, alerts and incidents, we derive the insights required to deliver various use-cases. For example, the insights derived from device fault data and incidents is used to better predict failures before they occur and allow us to proactively prevent issues before they occur. Our analytics of tickets logged into our ITSM layer is utilized to better automate the fix of tickets with minimal to no human intervention and our analytics on cloud spread across different cloud providers provides us with the visibility to suggest optimizing the provider landscape for our clients.

### Products

#### Software

Fujitsu provides a systematic lineup of software products designed to facilitate the use of Big Data. This lineup features software products that customers can easily use on-site. Fujitsu has developed, through implementation of Platform Services for Data Utilization, a cloud service for utilizing Big Data. In addition, we have helped customers to utilize Big Data by making it simple to install and operate, and by providing an ecosystem that makes it easy for customers to combine software with other products including open-source software.

##### ■ Middleware

- FUJITSU Software Interstage Big Data Parallel Processing Server
- FUJITSU Software Interstage Big Data Complex Event Processing Server
- FUJITSU Software Interstage Terracotta BigMemory
- FUJITSU Software Symfoware Analytics Server

#### Server

Each application has different requirements for an IT infrastructure and the underlying servers. For this reason, Fujitsu offers a wide range of form factors that are designed to meet the most diverse demands, application requirements and companies of different sizes.

The FUJITSU Server PRIMERGY CX scale-out system family are designed for data intensive workloads such as the analysis of unstructured data, transaction databases as well as massive parallel computing power from today's high performance computing (HPC) applications in fields such as scientific research, product development and business intelligence. They focus on providing large datacenters with massive scale-out x86 server power while at the same time delivering new datacenter economics for server density, energy consumption, heat optimization and lower overall operational costs.

##### ■ Associated Hardware:

- FUJITSU Server PRIMERGY CX400 M2
- FUJITSU Server PRIMERGY CX600 M1
- FUJITSU Server PRIMEQUEST 2800B3
- FUJITSU Server PRIMEQUEST 2400E3
- FUJITSU Server PRIMERGY RX4770 M3
- FUJITSU Server PRIMEQUEST 2800E3

#### Integrated Systems

Under the name of FUJITSU Integrated System PRIMEFLEX, Fujitsu provides a broad lineup of Integrated Systems for customer's marketing innovation. (For a full description, please see the 'Integrated Computing' section on page 56.)

# Hybrid IT - Cloud

Cloud offers obvious agility, speed and cost efficiency advantages and has grown from an emerging trend to becoming part of the standard IT services delivery model for many organizations today. However by blending the best of cloud powered and on premise IT, the balance that large organizations seek is the balance that Hybrid IT delivers. Fujitsu's Hybrid IT provides the perfect balance that is the foundation of our digital services, delivered in a range of styles to meet customers' needs for security, data regulation and business agility.


Hybrid IT improves business productivity in some obvious ways e.g. enhancing business user mobility by making applications and information available across time, space and devices. But there are other ways in which productivity improves as well. For example, creating an optimal balance between empowering end users to order and manage their own portfolio of IT services whilst retaining sufficient operational and governance control. Our approach to delivering Hybrid IT service further drives productivity gains by providing management of multiple cloud services, contracts and relationships. A simplified standard contract allows organizations access to multiple cloud platforms through a single document. Our ability to provide end to end managed networks and high performance connectivity further frees up the customer's internal IT organization to focus on business innovation, not on managing IT complexity.

## Services, Products and Solutions

### Services

### Cloud

#### ■ Fujitsu Cloud Service K5

FUJITSU Cloud Service K5 is our next generation cloud platform. FUJITSU Cloud Service K5 combines the value of open source technologies and Fujitsu's expertise and experience. The integrated Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) functionality supports both robust IT and fast IT through the same platform. FUJITSU Cloud Service K5 is a single standard platform which is available globally – it is based on a common architecture and can flexibly be deployed as private or public cloud, on premise or in a Fujitsu data center. FUJITSU Cloud Service K5 is based on OpenStack for IaaS and CloudFoundry ™ and Fujitsu own-IP for the PaaS capability. The use of Open Source ensures speed of innovation, avoids vendor lock-in and delivers cost efficiencies.
The Fujitsu cloud IaaS portfolio includes public cloud, virtual private cloud and both on- and off-premise private cloud.
K5 offers a single enterprise cloud platform to simplify digital business transformation. Fujitsu Cloud Service K5 is specifically created to enable efficient, easy and cost effective enterprise level digital transformation. The benefits of K5 include:

- a universal platform, consolidating workloads to increase operational efficiency
- an open platform, maximizing interoperability
- integration of legacy systems with new technology, saving money
- enterprise-class - 99.99% availability and performance predictability across the technology stack

K5 supports OpenStack ™, VMware ™ and Bare Metal ™, and is the platform of choice for a broad range of IT services. Our highly flexible platform includes network, Infrastructure as a Service (IaaS) and Platform as a Service (PaaS).
Unlike other vendors typically offering cloud services in collaboration with third-party partners, we deliver our end-to-end enterprise cloud services using our in-house expertise and knowledge. We give you the technologies, tools, services and partnerships customers need to support digitalization and modernization across your entire organization.
With Fujitsu Cloud Service K5, customers can modernize, become digitally enabled and transform your existing IT environment. You can integrate your legacy systems with enterprise cloud solutions, to get value out of your existing IT investment while taking advantage of new technology.
The integrated Infrastructure as a Service (IaaS) and Platform as a Service (PaaS) functionality supports both robust IT and fast IT through the same platform.
Fujitsu is adding enterprise-grade features to OpenStack which makes Fujitsu Cloud Service K5 an ideal platform of choice for mission-critical systems.

#### ■ Hybrid IT Transformation service

Fujitsu Hybrid IT Transformation services enable organizations to transform their traditional data center based IT systems into a more efficient and agile hybrid environment.
This service enables detailed analysis and planning that a client will need to transform traditional DC based IT into a Hybrid IT model, delivering a definitive list of DC assets to consider, a projection of the future provisioning environment, a transformation plan, and (if requested) an ROI.
Typical target clients will be considering whether or how to consolidate or rationalize DCs, they would need their IT to be more agile so that they can accommodate mergers, acquisitions or divestitures, in addition, they would want their IT to become more responsive so that they can speed up their time to market; many would want to combat Shadow IT, or be interested in moving to OPEX based IT operations to simplify their internal billing.
Our Hybrid IT Transformation – Implement service takes the output of the assessment and planning, provided by the Hybrid IT Transformation – Blueprint service, and uses this information to execute a risk-managed transformation of your client's DC environment into a mix of public cloud, private cloud or optimized hosting. We take full end-to end responsibility for migrating the targeted workloads and ensure that end-to-end business systems remain running with the minimum interruptions whilst the migration is on-going. We are also able to decommission the source systems once the migration of the workloads and the go-live is complete.

# Services, Products and Solutions

## Services

### Hybrid IT Managed Services

Hybrid IT Managed Service enables the customers journey to digital, managing the complexity of Cloud in providing proactive management of business services. Fujitsu Hybrid IT Managed Service provides expert day-to-day operational management of services deployed to the cloud, helping customers run their business by ensuring the mission critical IT services they depend on are available when they need them, but still delivered using the agility and utility consumption model of cloud. We support the modernization of legacy resources and the transformation of systems to assure business agility with Elastic Application Works and provide Cloud Foundry ™ for fast development and deployment of cloud-native applications. With extensive Web API management we allow the easy modernization of existing backbone legacy systems.

**•Fujitsu Cloud PaaS RunMyProcess**

Fujitsu RunMyProcess is a unique cloud platform that enables hundreds of leading companies in over 45 countries to remove the technology barriers to digital transformation. This innovative platform empowers enterprises to rapidly create, deploy and distribute highly customized enterprise and mobile business applications designed to meet their specific needs - unifying user experiences, connecting information systems, accelerating time to value and enabling digital scale.

**•Fujitsu Cloud Enablement Services**

This provides a platform with standard functions needed to build and operate a customer's SaaS, such as an enterprise app store, ID management and authentication and subscriptions and fees. This service let companies focus on developing and operating the applications and packages that are at the core of their business, increasing their productivity and dramatically speeding up the process of launching a SaaS.

### Hybrid IT Service Orchestration

Orchestration provides the aggregation, connectivity and unification of services that businesses need to realize the full value of Hybrid IT. It provides organizations with a single, seamless solution for managing both traditional IT and all the new cloud services they're rapidly adopting. It helps you retake control of their environment today, and ensure you retain that control as changes happen in the future.

Only by bringing everything in your Hybrid IT environment together you can achieve true, complete cohesion between all elements. That's why Fujitsu focuses on six distinct areas of enterprise orchestration of: service, technical, supplier, process, security and compliance.

No matter what area of orchestration you need help with, 'Fujitsu Orchestration Multi Cloud management' services encompass everything – from the technical layer right up to the service and business layer. We help ensure that once you take control of the environment, you can start getting the maximum value from it immediately.

### Data Center Services

Fujitsu's Data Center Services provide our customers with the complete range of services to ensure their IT systems are fully operational for their users as well as to improve their IT flexibility, efficiency, performance and to reduce their costs.

### Managed Hosting – cloud and non-cloud systems

We provide a range of managed hosting services to meet your specific business needs. These cover every aspect of implementation and management for your compute and storage environment, including platform and directory services, infrastructure applications and database environment. Each service offers a range of options to allow you to select the package that is right for your business.

### Software as a Service (SaaS)

Fujitsu offers implementation, configuration and integration services to support the delivery of market leading SaaS solutions including ServiceNow, Salesforce.com and Microsoft Office 365.

## Products

### Integrated Systems

#### ■ Private Cloud Infrastructures

Fujitsu offers a range of options for quickly building and scaling private clouds and hybrid clouds. The pre-integrated IT infrastructure solutions combine high-performance and energy-efficient hardware, a holistic operating environment, an optimized deployment service together with a comprehensive professional service portfolio to reduce complexity in design, build and operation of private cloud infrastructures.

■ **FUJITSU Integrated System PRIMEFLEX for VMware Cloud Foundation**

This solution is a ready-to-run software-defined data center with virtualized compute, storage and network resources, based on a hyper-converged architecture. It is optimized to reduce complexity in the design and build phase of a VMware-based SDDC environment – and at a significantly lower cost compared with do-it-yourself approaches.

■ **PRIMEFLEX vShape**

PRIMEFLEX vShape is a virtual infrastructure solution, giving customers choice in terms of size (from 25 to 2,400 virtual machines), in terms of virtualization technology (either VMware vSphere or Microsoft Hyper-V) and in terms of external storage (FUJITSU Storage ETERNUS or NetApp storage). The built-in network switches come from Brocade. The optional VMware Horizon software makes PRIMEFLEX vShape a solid foundation for virtual desktops. By adding the VMware vRealize option to a VMware-based PRIMEFLEX vShape, the virtual infrastructure turns into a private cloud infrastructure. All hardware and software components are ideally harmonized and validated as a single solution. PRIMEFLEX vShape reduces integration and implementation time and risks of building virtual infrastructures.

■ **FUJITSU Integrated System PRIMEFLEX for OpenStack**

In order to reduce the various risks that can impact time-lines and budgets in the implementation phase of a complex private cloud project based on OpenStack, Fujitsu developed a converged infrastructure for OpenStack private cloud IaaS deployments, giving customers the choice to either use Red Hat OpenStack Platform or SUSE OpenStack Cloud. FUJITSU Integrated System PRIMEFLEX for OpenStack provides an enterprise hardened OpenStack platform and combines a high-performance and energy-efficient Fujitsu / Brocade hardware stack, OpenStack software from market leaders, one-stop support and a comprehensive professional service portfolio–all in one package. PRIMEFLEX for OpenStack is the most reliable way to deploy a highly flexible, open and cost-effective OpenStack private cloud IaaS platform.

■ **Servers:**

No Hybrid IT environment, no cloud solution can work without a powerful basis: FUJITSU Server PRIMERGY not only is the basis for our own FUJITSU Cloud Service K5 offering, but can be the hardware part of any hybrid IT environment. Select from RX rack-optimized servers or built on powerful, multi-modular CX scale-out systems. Even TX tower servers can be an on-site hardware sister to the big brother "cloud".

# Hybrid IT - Integrated Computing

'Workload optimized autonomic computing environments' integrated with Fujitsu's technology and expertise.

## Services, Products and Solutions

### Products

### Integrated Systems

Under the FUJITSU Integrated System PRIMEFLEX brand, FUJITSU provides a broad line-up of Integrated Systems. The fact that data center components are pre-defined, pre-tested reduces the complexity and the risk of building data center infrastructures, while reducing time to production and cost, as well as increasing operational efficiency. PRIMEFLEX encompasses factory-installed solutions which are ready-to-run and reference architectures which can be easily adjusted to customer-specific requirements. Both options are supplemented by truly attractive service offerings. PRIMEFLEX offerings are available for various data center themes such as Virtualization, Private Cloud, Big Data and Analytics, as well as High Performance Computing. Furthermore, PRIMEFLEX includes solutions addressing SAP and Oracle environments.

#### Virtualization

- FUJITSU Integrated System PRIMEFLEX vShape
- FUJITSU Integrated System PRIMEFLEX for VMware vSAN
- FUJITSU Integrated System PRIMEFLEX for VMware Cloud Foundation
- FUJITSU Integrated System PRIMEFLEX Cluster-in-a-box
- FUJITSU Integrated System PRIMEFLEX for Storage Spaces Direct

#### Private Cloud

- FUJITSU Integrated System PRIMEFLEX for VMware Cloud Foundation
- FUJITSU Integrated System PRIMEFLEX vShape
- FUJITSU Integrated System PRIMEFLEX for OpenStack

#### Big Data and Analytics

- FUJITSU Integrated System PRIMEFLEX for Hadoop
- FUJITSU Integrated System PRIMEFLEX for SAP HANA
- FUJITSU Integrated System PRIMEFLEX for Oracle Database

#### HPC

- FUJITSU Integrated System PRIMEFLEX for HPC

#### SAP

- FUJITSU Integrated System PRIMEFLEX for SAP HANA
- FUJITSU Integrated System PRIMEFLEX for SAP Landscapes

#### Oracle

- FUJITSU Integrated System PRIMEFLEX for Oracle Database

### FUJITSU Integrated System PRIMEFLEX for VMware vSAN

PRIMEFLEX for VMware vSAN is a hyper-converged system based on the VMware HCI software stack including VMware vSphere and vSAN. The system supports up to 64 server nodes and is available in various vSAN Ready Nodes configurations with pre-installed software for specific use cases, such as All-Flash configurations for write-intensive workloads demanding for low latency (e.g. virtual desktop infrastructure with either linked clones or full clones), hybrid configurations with hard disks and Solid State Disks for mixed workloads, and special high density configurations for use cases with data center footprint being the critical parameter. PRIMEFLEX for VMware vSAN is also a sound foundation for private cloud infrastructures. The reference architecture approach allows flexible adjustments of the pre-defined configurations with regard to processor type, main memory size and storage capacity.

### FUJITSU Integrated System PRIMEFLEX for Storage Spaces Direct

PRIMEFLEX for Storage Spaces Direct is a hyper-converged system based on software-defined storage technology (Storage Spaces Direct) integrated in the Windows Server 2016 Datacenter Edition. The system supports up to 16 server nodes. Various configurations for a broad range of use cases are in place covering mixed workloads as well as workloads requiring extreme I/O performance. Configuration options include hard disks, Solid State Disks and high-speed NVMe disks that allow for setting up a 2-tier and 3-tier storage infrastructure. The reference architecture approach allows flexible adjustments of the pre-defined configurations.

### FUJITSU Integrated System PRIMEFLEX for Hadoop

PRIMEFLEX for Hadoop is a powerful and scalable platform analyzing Big Data volumes at high velocity. PRIMEFLEX for Hadoop combines the advantages of pre-configured and pre-tested hardware based on industry standard components with open source-software provided by Cloudera and Big Data analytics software provided by Datameer. PRIMEFLEX for Hadoop is provided as a ready-to-run integrated as well as a Reference Architecture for flexible deployment, and enables business users to uncover hidden information from huge amounts of data. In addition, strategic Big Data consulting, analytics consulting, consulting for Hadoop, and integration and maintenance services, are supplementing the offering.

### FUJITSU Integrated System PRIMEFLEX Cluster-in-a-box

PRIMEFLEX Cluster-in-a-box is a hyper-converged system based on Microsoft Storage Spaces – a feature of the Windows Server Standard Edition. The system comes with 2 server nodes and is expandable to 4 server nodes, all in a 2U chassis. PRIMEFLEX Cluster-in-a-box includes fixed configurations with just a single order code, as well as flexible configuration options, allowing the adaptation to special customer needs with regard to processors, main memory and disk capacity. Furthermore, you can choose the operating system edition and the network connections that are most appropriate for you. PRIMEFLEX Cluster-in-a-box is designed for delivering a continuous availability solution at affordable costs to small and mid-market organizations. No matter if you decide on a fixed or a flexible configuration, you will get PRIMEFLEX Cluster-in-a-box pre-installed and ready-to-run. Just turn it on, run our configuration wizard, and your hyper-converged environment is ready to work.

### FUJITSU Integrated System PRIMEFLEX for HPC

PRIMEFLEX for HPC is pre-integrated and optimized for specific compute-intensive applications, such as modeling and simulations, or other analytics tasks. PRIMEFLEX for HPC comprises appliances optimized for specific industries and ISV applications, e.g. from ANSYS, COMSOL and Autodesk, as well as pre-defined and pre-tested reference architectures adaptable to individual needs. To ensure an optimal price-performance, all components of PRIMEFLEX for HPC are selected based on thorough benchmark testing. This reduces the time and cost of acquisition, and provides an assured basis for higher efficiency and less risk.

The integrated Fujitsu HPC Cluster Suite breathes life to the HPC cluster. It includes all ingredients needed for HPC, such as co-processor support, cluster deployment and management, workload management, parallelization software, scientific libraries, compilers and other tools, as well as an optional parallel file system (Fujitsu Exabyte File System). The intuitive operation which results from the built-in HPC Gateway simplifies user access and all aspects of HPC work management, making PRIMEFLEX for HPC the most productive and coherent HPC workplace in workplace in the market today.

### FUJITSU Integrated System PRIMEFLEX for SAP HANA

PRIMEFLEX for SAP HANA enables simplified, fast and secure implementation and operation of SAP HANA. The pre-defined and pre-tested infrastructure solution is based on SAP-certified components and supplemented by a broad services portfolio. It helps customers fully exploit the potential of SAP HANA and accelerate and innovate their business processes. In addition, PRIMEFLEX for Oracle Database is available for Japan.

# Services, Products and Solutions

## Servers

The FUJITSU server line represents one of the broadest portfolios in the market. This enables us to talk with our customers as a trusted advisor with the target to provide them with the right combination of systems, solutions and expertise to guarantee maximum productivity, efficiency and flexibility, delivering confidence and reliability.

### Industry Standard Server

Industry's most complete x86-based portfolio for companies of all sizes, across all industries and for any type of workload.

- FUJITSU Server PRIMERGY

### Mission Critical x86 Server

New levels of x86 server performance for in-memory computing, resource-intensive applications and mission-critical x86 uptime.

- FUJITSU Server PRIMEQUEST

### Unix Server

- FUJITSU SPARC M12 Servers

Flexible and scalable systems based on the latest SPARC64 XII processor, which features the world's most powerful processor core, delivering high performance and high availability for mission-critical enterprise workloads and cloud computing.

### Mainframe

- FUJITSU Server GS21, BS2000, VME

### Supercomputer

Fujitsu's supercomputer provides the ability to address high magnitude problems by delivering over 23 petaflops, a quantum leap in processing performance.

- FUJITSU Supercomputer PRIMEHPC FX100

## Storage

Under 'Business-centric Storage' Fujitsu provides ETERNUS DX disk and ETERNUS AF All- flash systems, ETERNUS CD Hyper-scale and software defined storage, ETERNUS CS data protection appliances and ETERNUS LT tape systems enabling customers to align storage resources with business priorities and to manage their increasing data volumes at less costs.

### Hybrid Disk and Flash Storage Systems

- FUJITSU Storage ETERNUS DX series

### All-flash systems

- FUJITSU Storage ETERNUS AF

### Hyper-scale and software-defined storage

- FUJITSU Storage ETERNUS CD10000

### Tape Systems

- FUJITSU Storage ETERNUS LT series

### Data Protection Appliances

- FUJITSU Storage ETERNUS CS series

### Storage Management Software

- FUJITSU Storage ETERNUS SF suite

## Software

Fujitsu is the only Japanese vendor with a systematic software product lineup. Fujitsu integrates optimal systems according to customer needs and objectives, based on a core lineup of proprietary technologies and products combined with supplementary partner software products and open-source software.

### BPM/SOA/XBRL

- FUJITSU Software Interstage

### Operation Management

- FUJITSU Software Systemwalker

### Database

- FUJITSU Software Enterprise Postgres
- Oracle
- Microsoft

## Network

Along with in-house development of products that facilitate business continuity, security measures, and operation and management, Fujitsu can evaluate and verify third-party products. By embedding these products in networks, Fujitsu supplies optimal networks for each customer to rapidly meet their diversifying needs.

- Router
- LAN Switch
- Security
- Bandwidth Control, Load Balancer
- IP Telephony
- Unified Communication

## Product Support Services

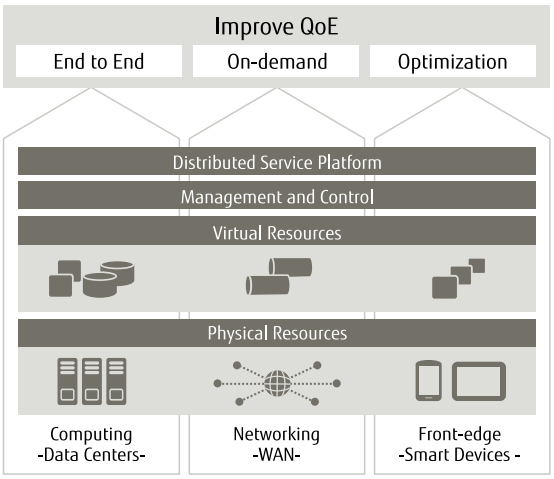
In addition to cutting-edge products, Fujitsu delivers worldwide Product Support Services. A comprehensive product support portfolio containing standard break/fix services as well as proactive support helps our customers save time and money and reduces the burden on internal IT staff. Fujitsu delivers Product Support Services through certified support engineers for individual products as well as for IT infrastructures as a 'one-stop shop' support offering. The services range from installing new products to providing fast and responsive support for Fujitsu hardware, software and IT infrastructures for solution business.

Note: Availability featured here may differ by region.

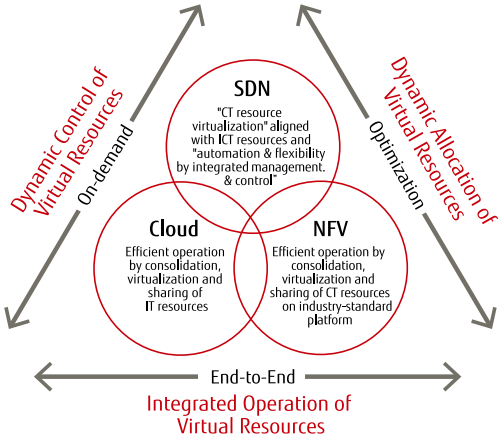
# Hybrid IT – Software-Defined Connected Infrastructure

The 'FUJITSU Intelligent Networking and Computing Architecture' is a new architecture for next generation ICT infrastructure. Fujitsu plans to release products that will conform to this architecture across various areas of technology.

Fujitsu Intelligent Networking and Computing Architecture




Technology Map for Network-wide Optimization




## Services, Products and Solutions

### Services

#### Managed Infrastructure Services

Fujitsu's Managed Infrastructure Services provides a cost effective, reliable and flexible ICT infrastructure to customers. This infrastructure may be owned by the customer or Fujitsu on their behalf. Our services comprise Data Center Services, End User Services, Service Desk, Technical Support Services, Infrastructure as a Service, and Network and Communication.

- **Network and Communications**

Fujitsu's network services for inter-site communications, deliver a carrier-class network infrastructure combining cost competitiveness and security with high performance. (For a full description, please see the 'Mobile' section on page 51.)

- **Global WAN Services**

Fujitsu Wide Area Network (WAN) provides global connectivity. This includes Managed WAN, Managed Virtual Private Networks, Managed Wavelength and Managed Firewall Services together with Campus LAN Distributed LAN services.

### Products

#### Software

The penetration of broadband networks has led to an increase of digitalized data flowing through networks. As a result, a variety of services are now provided over networks, such as IP telephony and video distribution services. As next-generation networks become increasingly important to society, network infrastructure has become large and complex. This has created a host of crucial issues for service providers. Issues include network operation and management and problem resolution methods, in addition to quality assurance for network services and infrastructure operation and management. To solve these issues, Fujitsu provides network service management software that enables operation and management and quality assurance for next-generation networks.

- **Network Service Management Software for Telecom Carrier**
  - FUJITSU Network Proactnes series
  - FUJITSU Network Netsmart series
- **Network Service Management Software for Enterprise**
- **Dynamic Resource Management Software**
  - FUJITSU Software ServerView Resource Orchestrator
- **Network Operation and Management Software**
  - FUJITSU Software Systemwalker Network Manager
  - FUJITSU Software Systemwalker Network Assist
  - FUJITSU Managed Network Operating System
- **Network Service Management Software**
  - FUJITSU Software Systemwalker Service Quality Coordinator
- **Network Virtualization Software**
  - Midokura Enterprise MidoNet
  - Fujitsu ServerView Infrastructure Manager

#### Network

Fujitsu supplies a comprehensive range of network products, including communications systems for carriers and network devices for enterprises. The former constitutes the backbone of our ICT-driven society, such as core networks, metro networks, and access networks. The latter is used to integrate internal networks within enterprises.

- **SDN/NFV related Software**
  - FUJITSU Network Virtuora series
- **Blade type Network System**
  - FUJITSU Network 1FINITY series
- **High-end Router**
  - Fujitsu and Cisco CSR series
  - Fujitsu and Cisco XR12000 series
- **Optical Network System**
  - FUJITSU Network FLASHWAVE series
- **Radio Access Network System**
  - FUJITSU Network BroadOne series
  - FUJITSU Network FRX series
- **Router**
- **LAN Switch**
  - Wireless LANs
  - Software Defined WANs
  - Low Power WANs
  - Personal Area Networks
- **Security**
- **Bandwidth Control**
- **Load Balancer**
- **IP Telephony**
- **Unified Communication**
- **Video Conferencing / Bridges**



Note: Availability featured here may differ by region.

# Cyber Security

Fujitsu helps organizations to manage their information security and continuity risks effectively, inline with their business strategy, providing flexibility in the way they work and enabling secure and resilient business. Fujitsu offers a full range of security services that comprises consultancy, implementation and managed security services backed by best-of-breed security technologies including our own developed security offerings such as PalmSecure and SURIENT.

## Services, Products and Solutions

### Services

#### Business and Application Services

##### ■ Information Management

■ **Cyber Security Services – element of both Business and Application Services and Managed Infrastructure Services**

Emerging IT trends give businesses a competitive edge. They also potentially expose them to new cyber threats. So how do you allow your organization to thrive while keeping it secure?
Cloud computing, Internet of Things, and software-defined networking, among others, have ushered in a new era of IT. These new threats call for new ideas and approaches in Cyber Security. Businesses need to adopt a whole lifecycle approach to how they deal with security. To keep up with the aggressive pace of change within an ever changing digital world and to counter the ever expanding threat landscape businesses need to continually evolve their security capabilities. Fujitsu believes the answer lies in intelligence-led security. This is a new way of understanding, monitoring, and responding to threats. This is also the most effective when fully integrated across an entire security lifecycle. Highly versatile, it gives organizations the ideal response to constantly shifting security challenges – based on a comprehensive security portfolio. Fujitsu provides the experience and global scale to optimize organizations' approach to security to protect their reputation and revenue. And also providing rapid visibility and protection against new threats and allowing controlled usage of business enabling applications, services and other Cloud based services.
By answering your security requirements with both our local and global Security Operation Centers, we offer cybersecurity tailored to your requirements and based on our experience in highly secure environments of more than 40 years. Fujitsu provides guidance on the most appropriate security controls to protect organizations, ongoing management of cyber security capabilities on behalf of customers and undertakes 24/7 security monitoring from its global Security Operations Centers (SOC). Also, Fujitsu's security professionals are trusted advisors with the expertise to enable organizations to prepare for and respond to cyber security incidents effectively and efficiently. We use market leading security products and professional services to support the assessment of risk, define requirements, provide technical and service design and architecture, as well as ensuring effective deployment and operation of the Managed Security Services. Fujitsu provides Cyber Threat Intelligence and Threat Response services to proactively mitigate against threats as well as providing timely and expert response services to mitigate the impact of security incidents to our customers. As a global security and service integrator, Fujitsu provides security and resiliency consultancy services across the full delivery lifecycle delivered with the expertise and experience gained from years of security and service integration. The breadth of customers and partners that Fujitsu works with provide us with a clear understanding of the changing security model, the threat landscape and our continually evolving managed security services are underpinned by threat intelligence services we can provide with deep understanding of the customers' situation.

##### ■ Enterprise Application

Fujitsu's Enterprise Applications services cover the design, development, configuration, implementation, rollout and ongoing management of solutions based on packaged ERP applications. (For a full description, please see the 'Integration' section on page 48.)

##### ■ Software as a Service

Fujitsu offers a wide range of packaged applications as subscription-based services. (For a full description of 'Software as a Service' and offerings, please see the 'Cloud' section on page 55.)

##### ■ Data Center Services

Fujitsu's Data Center Services provide our customers with the complete range of services to ensure their IT systems are fully operational for their users as well as to improve their IT flexibility, efficiency, performance and to reduce their costs. (For a full description, please see the 'Integration' section on page 48.)

##### ■ End User Services (EUS)

Fujitsu's End User Services enables you to create a digital workplace environment that gives everyone in your organization the power to connect, collaborate and innovate. Giving your employees a unified platform they can use on almost any device, and giving them seamless access to familiar tools and workflows in a completely secure environment.
(For a full description, please see the 'Integration' section on page 48.)

### Solutions

#### Business and Technology Solutions

##### ■ Security Solutions

Fujitsu helps organizations to manage their information security and continuity risks effectively, in-line with their business strategy. This is achieved by the extensive combination of Fujitsu's long-time user security expertise, partnerships with leading security vendors and own developed security solutions - easy to be integrated and to be enhanced with complementary software and hardware offerings to meet unique user security requirements. Two prominent solution examples for authentication / identity management and secure IT systems are described as follows:

■ FUJITSU Biometric Authentication Solutions – based on PalmSecure technology. We provide high reliability and security for a wide range of applications and market segments. This hygienic, contact-less technology uses unique vascular patterns as highly secure personal identification data, increasing user safety and comfort. PalmSecure ID Match is a universal platform for reinforcing ID cards for authentication by combining them with PalmSecure designed for a wide range of scenarios and with our Software Development Kit (SDK) easy to be integrated within IAM applications.
With PalmSecure ID ACCESS we provide a highly secure off-the-shelf solution for physical access control of buildings for both front end and data center applications. New mobile workplace systems as well as desktop and ultrathin clients with integrated PalmSecure technology increase the security level dramatically. The combination of PalmSecure technology based on match-on-device solutions and high level security software is ideal for secured cloud access and secure payment applications .
Additionally we offer with the new PalmSecure SL type sensor a small footprint sensor for desktop authentication beside PS mouse. PalmSecure ID Mobile is a convenient method to authenticate, using a smart phone carrying the personal palm vein template inside. Together with leading partners we open the field for biometric authentication into new application landscapes. Examples are:
real-time bioLock™ for use with SAP® ERP - powered by Fujitsu PalmSecure which significantly improves security by monitoring and controlling SAP system operations using re-authentication at user-specific checkpoints.
BioSec solutions based on Fujitsu PalmSecure allows the biometric identification of large numbers of visitors at sports stadiums, preventing that non allowed people can access the stadium, ensuring that the visitors can only access the sector they are permitted to enter and preventing that stolen or found tickets can be used by other people.

■ **SURIENT Secure Rack**

The SURIENT Secure Rack protects sensitive data / services within racks from non-authorized access. It combines electromechanical locks and sensors with biometric authentication of PalmSecure ID Match. Racks can only be opened when the registered users authenticate themselves via palm vein recognition. Besides SURIENT Secure Rack that provides a fully configured rack, the SURIENT Secure Rack Upgrade Pack allows the easy upgrade of almost all existing and already deployed racks with electromechanical locks and biometric access control.

Note: Availability featured here may differ by region.

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**A Note Concerning Future Projections, Forecasts and Plans**
This publication contains forward-looking statements in addition to statements of fact regarding the Fujitsu Group's past and current situation. These forward-looking statements are based on information available at the time of publication and thus contain uncertainties. Therefore, the actual results of future business activities and future events could differ from the forward-looking statements shown in this publication. Please be advised that the Fujitsu Group shall bear no responsibility for any of these differences.



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